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VONDRÁK (J.) & NEUWIRTH (F.). **Inversion feucht gewordener Raffinade durch mikroskopische Pilze.** [The inversion of damp refined sugars by microscopic fungi.]—*Zeitschr. für Zuckerind.*, lvii, 3, pp. 17–21 ; 4, pp. 25–29, 4 figs., 1932.

An account is given of the extensive inversion under damp conditions of refined sugars (stated to be now frequent in Czecho-Slovakian factories owing to the economic necessity for prolonged storage) caused by three fungi, viz., *Penicillium crustaceum*, *Aspergillus glaucus*, and *Torula sacchari* [*R.A.M.*, x, p. 656]. Care should be taken to provide the storage rooms with adequate facilities for heating.

CIFERRI (R.) & HERTER (W. G.). **Ustilaginales uruguayenses ; itinera Herteriana IV.** [Uruguayan Ustilaginales ; Herter's itinerary IV.]—*Bot. Arch.*, xxxiv, 3–4, pp. 527–540, 1932.

A list is given of 35 Ustilaginales collected by the second-named author in Uruguay (and in a few cases also in Paraguay and Brazil), with critical and taxonomic notes by the first-named writer.

CHILD (MARION). **The genus Daldinia.**—*Ann. Missouri Bot. Gard.*, xix, 4, pp. 429–496, 8 pl., 1932.

Thirteen species of *Daldinia* (three new) are described with extensive taxonomic, geographical, and historical annotations, while a further ten are listed as doubtful or excluded. A key to the recognition of the species is given.

CHAMBERLAIN (E. E.). **Sclerotium disease (Sclerotinia sclerotiorum) of Tomatoes.**—*New Zealand Journ. of Agric.*, xlv, 5, pp. 260–268, 6 figs., 1932.

This is a brief morphological and biological account of the stalk rot of tomatoes caused by *Sclerotinia sclerotiorum* [*R.A.M.*, x, p. 494] which is stated to be one of the most serious diseases of the crop in New Zealand. A discussion is also given of the measures for its prevention and control.

RIPPEL (K.). **Über die Wirkung von Fungiziden auf Cladosporium fulvum Cooke und die Aussichten einer chemotherapeutischen Bekämpfung der Pilze. Zugleich ein Beitrag zu den Arbeitsmethoden der experimentellen Phytopathologie.** [On the action of fungicides on *Cladosporium fulvum* Cooke and the prospects of a chemotherapeutical control of fungi. Together with a contribution to the working methods of experimental phytopathology.]—*Arch. für Mikrobiol.*, iii, pp. 543–558, 1932.

The values obtained in laboratory tests on the reaction of fungus spores to fungicides are not directly applicable to practical control, since the toxicity of a given quantity of the disinfectant depends on the spore numbers. The more numerous the latter in contact with the fungicide, the more resistant are they. Besides the particular fungus to be tested, others should be used to provide a basis for comparison. For instance, the spores of the tomato leaf mould fungus, *Cladosporium fulvum* [*R.A.M.*, xi, p. 680], were found to be much more resistant to fungicidal action than those of the other organisms tested. In order to destroy the fungus it would be necessary to use the preparations at such high concentrations as must seriously injure the plants. No prospects of chemical control can, therefore, be entertained. A species of *Botrytis*, evidently new, was found parasitizing *C. fulvum*.

GROSSMANN (HELEN). **Das Ulmensterben.** [The die-back of Elms.]—Reprinted from *Schweiz. Zeitschr. für Forstwesen, 1932*, 9 pp., 2 pl., 1932.

An account is given of the distribution, symptoms, mode of infection, and control (direct, indirect, and biological) of the die-back of elms (*Ceratostomella ulmi*) [*R.A.M.*, x, p. 564]. Attention is drawn to the ravages of the disease in France, especially at Versailles, where the famous avenue leading to the Grand Trianon has had to be entirely replanted with lime trees, while 60 to 70 per cent. of the elms in the courtyard on the town side of the palace are reduced to mere stumps. In Switzerland the writer has only observed the die-back on cultivated elms in avenues and the like, those growing wild in the forest being apparently free from infection. The work of the Dutch and German authorities on the disease is briefly summarized.

LENDNER (A.). **La 'maladie des Ormes' à Genève.** [The Elm disease at Geneva.]—*Verhandl. Schweiz. Naturforsch. Gesellsch.*, cxiii, pp. 371–372, 1932.

Elm trees in the Geneva parks and public gardens, avenues, and the like are stated to be suffering from die-back [see preceding abstract] which is attributed by the writer primarily to *Micrococcus ulmi* [*R.A.M.*, viii, p. 343] and *Pseudomonas lignicola* Westerdijk [ibid., ix, p. 5], the effects of *Graphium* [*Ceratostomella*] *ulmi* being secondary. All these organisms, as well as the *Scolytus* beetles found in the bark, are confined to weakly trees growing in dry soils. No symptoms of die-back have been observed among trees planted near water. The chronic form of the disease is mostly in evidence.

Loos (W.). **Über eine buchenholzbewohnende Ceratostomella, C. fagi nov. sp.** [On a Beech wood-inhabiting *Ceratostomella, C. fagi* nov. sp.]—*Arch. für Mikrobiol.*, iii, pp. 370–383, 6 figs., 1932. [Abs. in *Neuheiten auf dem Geb. des Pflanzensch., 1932*, 5–6, p. 121, 1932.]

Ceratostomella fagi n. sp. makes the best growth on beech wood, thriving also on spruce but developing very poorly on pine. The fungus causes [in Germany] a dark brown discoloration of beech wood and turns spruce brown and pine blue. The pine *Graphium* [*C. pini*] produces similar discolorations, whereas the action of *C. piceae* on the woods in question is negligible [cf. *R.A.M.*, xi, p. 616]. The new fungus is not a wood-destroyer but lives on the cell contents: it is sparing in its oxygen requirements and highly resistant to acids.

Gäumann (E.) & Campbell (E.). **Über eine Kiefernkrankheit im Gebiete des Ofenberges.** [On a Pine disease in the Ofenberg region.]—Reprinted from *Schweiz. Zeitschr. für Forstwesen, 1932*, 4 pp., 1 pl., 1932.

Pine trees in the Ofenberg region of Switzerland have been observed to show somewhat ill-defined symptoms of disease, such as a brown discoloration of single branches or twigs, curtailment of the current year's shoots, desiccation of the bark, and resin flow at the stem base. Affected trees die in three to four years. The coarse, snow-white mycelium below the cortex of the roots and especially at the collar at once suggested infection by *Agaricus melleus* [*Armillaria mellea*], a supposition that was confirmed by the isolation of the fungus in pure culture. Fruit bodies were not usually present in the natural stands, possibly on account of the exceptionally dry climate of the district under observation, to which also the somewhat atypical symptoms of the attack may probably be referred. The spread of the parasite is promoted to a certain extent by the systematic conservation of the affected pines under the 'nature protection' regulations of the forests comprising the national park. It has further been observed that the disease is much more severe in the pure pine stands of this region than in the natural mixed woodlands.

Annand (P. N.), Chamberlin (J. C.), Henderson (C. F.), & Waters (H. A.). **Movements of the Beet leaf hopper in 1930 in southern Idaho.**—*U.S. Dept. of Agric. Circ.* 244, 24 pp., 2 diags., 7 graphs, 2 maps, 1932.

The 1930 flight of beet leafhoppers (*Eutettix tenella*) was intensively studied in southern Idaho in 1930 in relation to the insect populations in the beet fields and consequent incidence of curly top [*R.A.M.*, xi, p. 419 and next abstract]. By 17th to 22nd June the leafhopper populations were extremely high in the sections concurrently showing a large percentage of curly top, and by 11th August leafhoppers had infested 90 to 95 per cent. of the crop of southern Idaho.

Twenty-one fields of Great Northern beans [*Phaseolus vulgaris*] were also inspected at regular intervals for curly top [ibid., xi, p. 556]. This plant is not a favourable host for the leafhopper, as

indicated by the fact that the numbers reached by 30th June were maintained but not increased throughout the season, while nymphs were very rare in the bean fields as late as 20th August. The curly top percentages rose steadily from 23rd June to 21st July, when a level was reached that was maintained for the rest of the season. The general movement of the insects was from the north-west and west.

Leaf hopper control in California.—*Facts about Sugar*, xxvii, 9, pp. 397–398, 2 figs., 1932.

The problem of beet leafhopper (*Eutettix tenella*) control [see preceding abstract] in California is claimed to have been solved by E. A. Schwing, entomologist to the Spreckels Sugar Company, who has organized a campaign with tractors to destroy the Russian thistles [*Salsola kali*: *R.A.M.*, vii, p. 137] constituting the favourite food of the insects, combined with the extensive use of an oil-pyrethrum spray. Many beet factories have been obliged to close down of recent years owing to the ravages of blight [curly top], the virus of which is disseminated by the leafhoppers, while tomatoes suffer from 'western yellows' [curly top] due to the same cause [ibid., xi, p. 210]. The cost of the campaign in 1931 was about $12,000, while the direct loss to beet growers on the 10,000 acres abandoned in 1925 on account of leafhopper infestation was $150,000.

Cochran (L. C.). **A study of two Septoria leaf spots of Celery.**—*Phytopath.*, xxii, 10, pp. 791–812, 4 figs., 1932.

This is an expanded account of the writer's investigations on the two forms of celery blight in the United States, viz., the small spot type caused by *Septoria apii-graveolentis* and the large spot due to *S. apii* [*R.A.M.*, x, p. 430]. The former is stated to be much the more common of the two in America. In pure culture *S. apii* made a spreading growth with a black submerged and white aerial mycelium, while the colonies of *S. apii-graveolentis* were more tufted and of a somewhat cheesy consistency. Potato dextrose agar was turned purple by *S. apii*. The spores of the small- and large-spot organisms were killed in ten minutes at 41° and 43° C., respectively, the optimum temperature for the growth of the former being 18° to 22° and for the latter 22° to 24°. None of the commercial varieties tested showed any evidence of resistance to these diseases, though the green ones are able to withstand their effects longer than the white.

Le Clerg (E. L.). **Leaf temperature of Lettuce and its relation to tipburn.**—*Phytopath.*, xxii, 10, pp. 851–855, 1932.

The results [which are tabulated and discussed] of determinations by means of thermocouples pressed against the surface and a Leeds and Northrup No. 2500–A galvanometer, of the leaf temperatures of lettuce in relation to tipburn in Colorado [*R.A.M.*, x, p. 439] showed that, in normal plants in sunlight, the leaf was always cooler than the air, the upper surface of the leaf bases being 2° C. and the lower surface 2·1° below air temperature. In diffuse light the reverse occurs, the upper surface of the base

being 1·6° and the lower 1·3° warmer than the air. The edge of healthy leaves was found to be 0·7° to 0·8° warmer than the leaf base both in sunlight and shade. Hourly temperature readings, made during the night on leaves in process of tipburning, indicated that the upper surface of the tip ranged from 0·5° to 11·8° lower than the air temperature. During the time of rapid development of tipburn (9.15 p.m. to 12 midnight) the range was from 0·5° to 3·1° below the surrounding air temperature. It is evident, therefore, that tipburn of lettuce is not caused by an excessive variation in the temperature of the leaf tissues as compared with that of the air.

DOIDGE (E[THEL] M.). **A wilt disease of Cucurbits.**—*Farming in South Africa*, vii, 79, pp. 299–300, 1 fig., 1932.

A brief, popular account is given of a wilt disease of marrows [*Cucurbita pepo*] and pumpkins [*C.* spp.] in the Pretoria district of South Africa, the causal organism of which was identified by Dr. Wollenweber as *Fusarium javanicum* var. *theobromae*, not hitherto reported on these hosts. Positive results were given by inoculation experiments on Long Bush marrows, Boer pumpkins, and Ice Cream watermelons, while White Spine cucumbers were fairly resistant. As a precautionary measure the seed should be immersed for 5 to 7 minutes in mercuric chloride (1 oz. in 7½ galls. water) or formalin (1 in 200).

PORTER (D. R.). **Some environmental relations of Watermelon wilt.**—*Phytopath.*, xxii, 10, pp. 813–825, 3 graphs, 1932.

Experiments conducted in Iowa in 1927 and 1928 indicated the existence of a positive correlation between air temperature and the rate of wilting in watermelons affected by *Fusarium niveum* [*R.A.M.*, xi, p. 558], and recent (1931) investigations with the Klondike variety in California confirmed the previous results. A further tendency was apparent for relatively rapid wilting to follow periods of relatively intense sunlight, as determined by the difference in the rate of evaporation between the black and white atmometer cells. The Californian tests showed that the rate of wilting increased with a decrease in the relative humidity of the air. The rate of evaporation as indicated by white atmometer cells, conditioned by air temperature and humidity, light intensity, and wind velocity, appears to influence the rate of wilting, an increase of which coincides with an augmented rate of evaporation, while a slow evaporation rate is accompanied by a relatively slow rate of wilting.

MONTET (D.). **L'action de l'oxyde noir d'urane en culture industrielle de champignons.** [The influence of black oxide of uranium in the commercial cultivation of Mushrooms.]—*Comptes rendus Soc. de Biol.*, cxi, 29, pp. 20–22, 1932.

The addition of black oxide of uranium (U_2O_5) at the rate of 0·2 to 1·5 gm. per kg. to the forcing-beds of edible mushrooms (*Psalliota campestris*) in northern France resulted in a considerable increase of yield (from 3·570 to 4·770 kg. fresh weight

per bed at 1 gm. per kg.). The incidence of 'môle' [*Mycogone perniciosa*: *R.A.M.*, xi, p. 493] was not affected by the treatment.

GENTY (P.). **Les Truffes de Bourgogne.** [The Truffles of Burgundy.]—*Bull. Soc. Bot. de France*, lxxix, 5–6, pp. 477–482, 1932.

The author states that, apart from the so-called 'false truffles' which have no gastronomic interest, he has established the natural occurrence in Burgundy of four species of true truffles, equal in quality to those of Périgord, namely: *Tuber melanosporum*, *T. brumale*, *T. aestivum*, and *T. uncinatum*. Of these the two first-named are most prized for culinary purposes. In size they vary from that of a walnut to that of a closed fist, and their peridium is covered with hexagonal, prismatic warts, but while *T. melanosporum* has a white flesh which at maturity turns a dark purplish-brown (almost black), and is only found under oaks, *T. brumale* has a white flesh which turns dark grey or brown at maturity, and occurs under various trees. Both are fairly frequent in Burgundy. The other two species are more common but less appreciated; they differ from each other chiefly in the time of the year when they reach maturity, and also in the shape of their spores.

DUFRÉNOY (J.). **Les facteurs écologiques de l'apparition des lésions de Plasmopara viticola sur la Vigne.** [The ecological factors in the development of the lesions of *Plasmopara viticola* on the Vine.]—*Comptes rendus Soc. de Biol.*, cxi, 30, pp. 187–188, 1932.

Observations during 1932 in various localities of south-eastern France showed that an attack of vine mildew (*Plasmopara viticola*) occurred in many places on 15th to 17th May as a result of primary infection at the end of the rainy spell from 28th April to 3rd May [cf. *R.A.M.*, xi, p. 623]. The mean temperature during the incubation period was 12·8° C. In another case primary infection took place on 15th to 17th May and the lesions developed after an incubation period of ten days at 15°. The attack developing from 4th to 7th June resulted from infection twelve days previously (13·5°) and the resulting zoospores provoked a further slight invasion after eight days (16°). Leaves infected towards the end of the period from 11th to 20th June developed spots from 24th to 27th June, while an attack from 3rd to 6th July followed invasion during the rains of 28th to 29th June (21°). Five days after infection on 4th to 5th June very severe symptoms developed on untreated vines, the mean temperature being 19·5°.

CADORET (A.). **La défense positive contre le mildiou en 1932.** [Effective control of mildew in 1932.]—*Prog. Agric. et Vitic.*, xcviii, 45, pp. 447–449, 1932.

The author states that experience in 1932 again confirmed the entire efficacy of the blue alkaline Bordeaux mixture recommended by him [*R.A.M.*, iii, p. 187; vii, p. 614], in the control of vine mildew [*Plasmopara viticola*], in every case where it was used. Extended inquiries in France and Algeria, and experiments at the

author's station showed that in vineyards sprayed with weak Bordeaux mixtures (1 and 2 per cent. copper sulphate) the losses caused by mildew ranged from 70 to 90 per cent. of the crop, while in vineyards sprayed with 3 per cent. Bordeaux mixture, they did not exceed 25 per cent., and they ranged only from 5 to 10 per cent. in those that were treated with a 4 per cent. mixture. At the two last-stated concentrations the mixture, when prepared with freshly slaked lime, is very adhesive by itself, and has never been known to cause scorching of the foliage.

MANZONI (L.). **Numero dei trattamenti antiperonosporici e concentrazione in rame delle poltiglie. Nota riguardante in modo speciale la provincia di Treviso.** [The number of anti-mildew treatments and the copper content of sprays. A note relating in particular to the province of Treviso.]—Reprinted from *Il Coltivatore e Giorn. Vinic. Ital.*, *1932*, 43, 8 pp., 1932.

After reviewing the reports issued from 1929 to 1932, inclusive, by the various stations established in the province of Treviso for forecasting attacks of vine mildew [*Plasmopara viticola*: *R.A.M.*, xii, p. 73], the author concludes that the number of spray applications required varies less than might be supposed from the different intensities with which infection develops. Even if the spring is fine and the locality not liable to severe outbreaks, the early spray applications should not be omitted, though the first one may be delayed until the oil spots appear. Dust applications with cupric sulphur should never be neglected, especially between the end of June and the beginning of August; if this period is wet they are essential.

In the author's opinion, the first spray applications, even in areas where the disease is dangerous, may quite safely be made with 0·5 to 0·7 per cent. Bordeaux mixture, though a concentration of 1 per cent. should be used for the final two.

Two commercial preparations of small copper content when tested against 1 per cent. Bordeaux mixture, five and six applications being made with each, gave eminently satisfactory results. One, 'minati' (G. Negroni, Treviso), consisted chiefly of ammonia and copper sulphate; it contained 6·25 per cent. copper, and was used at a concentration of 1 per cent., corresponding in copper content to 0·25 per cent. Bordeaux mixture. The other, the colloidal copper product, 'bouisol' (Società Industrie Chimiche, Rome) [ibid., xi, pp. 194, 396], contained about 12·5 per cent. copper, and was used at a concentration of 0·33 per cent. (even weaker concentrations were recommended by the manufacturers), roughly equivalent to 0·17 per cent. Bordeaux mixture. Bouisol was slightly the more efficacious of the two.

SERVEILLE (J.). **Encore l'alun.** [Alum again.]—*Prog. Agric. et Vitic.*, xcviii, 48, pp. 525–526, 1932.

In this brief note the author communicates a few observations made by him in 1932 which tend to show that alum, either alone or added to Bordeaux mixture, has a pronounced curative effect on vine mildew [*Plasmopara viticola*] both on the leaves and on the grape bunches [but cf. *R.A.M.*, xii, p. 139].

RAVAZ (L.). **Le rougeau.** [Rougeau.]—*Prog. Agric. et Vitic.*, xcviii, 48, pp. 509-512, 1932.

The fact that during the autumn of 1931 the non-parasitic rougeau disease of the vine [*R.A.M.*, viii, p. 484] was much more prevalent and severe in France than in that of 1932 is attributed by the author in part to the heavy rainfall of the former year, and also to the effect of the mildew [*Plasmopara viticola*] epidemic of 1932, which, by destroying the foliage, forced the stocks to put out new shoots and thus prolonged their active vegetation late into the season.

Fairly numerous cases of rougeau were observed in 1932 in Algeria and Tunis, especially in vineyards situated on low-lying, water-retaining soils. In Tunis the variety Grenache is stated to be more susceptible to the trouble than the others grown locally.

POLLACCI (G.). **Rassegna sull'attività del Laboratorio Crittogamico di Pavia (Osservatorio Fitopatologico per le provincie di Cremona, Parma, Pavia e Piacenza) durante l'anno 1931.** [Report on the activity of the Cryptogamic Laboratory of Pavia (Phytopathological Observatory for the provinces of Cremona, Parma, Pavia, and Piacenza) during the year 1931.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV[a], iii, pp. 310–324, 1932.

This account of the work done at the Cryptogamic Laboratory, Pavia, during 1931 [cf. *R.A.M.*, xi, p. 281] includes various items of phytopathological interest, several of which have already been noticed from other sources; of the others the following may be cited. Die-back of elms (*Graphium* [*Ceratostomella*] *ulmi*) [ibid., xi, p. 810] is now prevalent in the provinces of Parma, Piacenza, and Cremona. Numerous species of elms are to be distributed to the local growers in order that resistance trials may be conducted. An apparently new vine disease has caused losses in the vicinity of Stradella and Voghera, and material has been collected and is to be studied. The cause has not yet been definitely ascertained, but root rot was present on over one hundred of the affected vines. Other records include *Alternaria brassicae* var. *exitiosa* [*A. brassicae* Bolle nec. Sacc.; ibid., iv, p. 61] on cabbage, white rust of lemons (*Rhynchodiplodia citri*), *Bacillus amylovorus* on pear branches, twigs, and leaves and on apple branches and twigs, and *A. brassicae* on melon leaves.

SIMMONDS (J. H.). **The work of the Pathological Branch.**—*Ann. Rept. Queensland Dept. of Agric. & Stock for the year 1931–1932*, pp. 56–57, 1932.

Notes are given on the investigations of various phytopathological problems in Queensland during the period under review (year ending 30th June 1932), among which the following may be mentioned. Isolated cases of cotton wilt (*Verticillium* sp.) have been reported, mainly involving only small areas. A disease resembling the blight caused by *Ascochyta gossypii* in the United States [*R.A.M.*, ix, p. 240] developed in the Boonah district. A comparative morphological study of the fungus isolated from diseased plants and *A. gossypii* is in progress.

Blue mould [*Peronospora* sp.: ibid., xi, p. 607] is considered to be the most serious obstacle to tobacco cultivation in Queensland, where it is of practically universal occurrence.

Investigations by [R. B.] Morwood of banana heart rot [ibid., xi, p. 157] indicated that this disease may be readily controlled by the usual measures directed towards the eradication of bunchy top.

Pink disease of citrus (*Corticium salmonicolor*) was very prevalent in some of the northern districts.

Apples showed a spotting of the fruits resembling that due to *Phoma* [*Mycosphaerella*] *pomi* [ibid., xi, p. 427], an organism similar to which was isolated from infected material.

Thread blight (? *Marasmius* sp.) was observed in young tung oil [*Aleurites fordii*] plantations in North Queensland.

WALLACE (G. B.). **Report of the Mycologist.**—*Ann. Rept. Dept. Agric. Tanganyika Territory 1931*, pp. 94–97, 1932.

A rot of sisal [*Agave rigida* var. *sisalana*] plants, characterized by a yellow discoloration and decay originating in the leaf-stumps where leaves have been harvested in the wet season, has been investigated. The rot passes into the main stump which softens and turns black in the interior. Infection in one block of 4 hect. amounted to 5 per cent. The trouble is believed to be due to a deficiency of some essential plant food in the soil. A similar disturbance has been observed in young sisal transplants, apparently resulting from water deficiency or injury at the time of planting out, caused by the separation of the suckers from the parent rhizome.

Rhizoctonia bataticola [*Macrophomina phaseoli*] was twice found to be the cause of a root disease of tea, and occurred also on roots of *Cassia floribunda* growing as a shade tree in the plantations. A serious disease, believed to be of physiological origin and closely resembling one [? yellows] reported from Nyasaland [ibid., xi, p. 805], has been observed in the Iringa Province.

Tobacco is commonly attacked by white mould (*Erysiphe cichoracearum*) and frog-eye spot (*Cercospora nicotianae*) [ibid., xi, p. 677].

Coffee in the Usambara Mountains is liable to severe infection by *Armillaria mellea* [ibid., ix, p. 32], apparently a different strain from that attacking *Grevillea robusta* [ibid., xii, p. 142].

Ear rots of maize (*Gibberella moniliformis* and *G. saubinetii*) are prevalent, while other fungi infecting this crop include *Diplodia macrospora* and *D. zeae* [ibid., x, p. 238], causing a white decay of the ears, and *Nigrospora sphaerica*.

Cape gooseberries (*Physalis peruviana*) were severely damaged at Morogoro during July and August by white smut (*Entyloma physalidis*). *M. phaseoli* was responsible for heavy damping-off of citrus seedlings [ibid., ix, p. 628], and also occurred on *Dolichos lablab*, apparently in a parasitic form.

DEIGHTON (F. C.). **Mycological work.**—*Ann. Rept. Agric. Dept. Sierra Leone for the year 1931*, pp. 20–25, 1932.

During the period under review, Canary bananas [*Musa cavendishii*] in Sierra Leone became affected by a fruit spot prevalent in

wet seasons and associated with a *Pestalozzia* [cf. *R.A.M.*, xi, p. 190], the fruit when half ripe showing circular, water-soaked areas up to 2 mm. in diameter with a central spot which later developed into a dark sunken area with a narrow, water-soaked margin. Several dark areas sometimes coalesced. As the fruit matured, the small spots lengthened out into transverse streaks and the larger black areas into longitudinal cracks with grey margins.

Two apparently distinct types of *Gloeosporium* attack were observed on cassava. The die-back previously reported [ibid., xi, p. 97] affected nearly all the plants on a one-acre plot of the Mayugbe variety and a year later caused at least 20 and occasionally 100 per cent. defoliation. The Kanda and Sessile Leaf varieties showed grey lesions round the base of some of the upper leaves and for half an inch along the main stem below the node; later, the lesions spread above the node and the affected leaves wilted and died. Occasionally, the tip of the shoot wilted.

Most cassava varieties were affected to different degrees by mosaic [ibid., xi, p. 761], but spread was very slow, one of some Mende-lange plants set in July 1928, with the leaves in contact with affected cassava, becoming affected in October and the remainder still being healthy in the following May. In that month, about twenty healthy Mende-lange plants were set in beds adjacent to one containing affected cassava of the same variety; two became diseased the following November, and by the end of 1931 about one-third had contracted mosaic, one plant not becoming affected until late in the same year. Out of thirteen healthy plants of different varieties inoculated in November (by replacing a narrow strip of tissues down to the wood of the stem of a healthy plant by tissues from the internode of a mosaic plant) three in December produced mosaic shoots just below the graft.

Scab [*Sporotrichum citri*: ibid., xii, p. 166] is the chief disease of citrus in Sierra Leone, infection becoming abundant on the young leaves during the rainy season and afterwards decreasing; leaves produced in January frequently become slightly scabbed. In one nursery rough lemon [*Citrus limonia*] was badly attacked, grapefruit rather badly, Tahiti lime [*C. aurantifolia* var.: ibid., x, p. 786], sour orange [*C. aurantium* var. *bigaradia*], and Genoa lemon moderately, and tangerine [*C. nobilis* var. *deliciosa*] slightly; sweet orange [*C. sinensis*], shaddock [*C. decumana*], lime [*C. aurantifolia*], and sweet lime [*C. medica*] were unaffected.

Liberian coffee was attacked by a *Cephaleuros* causing canker-like, stem-girdling lesions.

Periwinkle (*Lochnera* [*Vinca*] *rosea*) was affected by a rosette apparently belonging to the virus group of diseases; the attack spread to neighbouring plants, but seedlings near an affected plant remained healthy.

Sesamum radiatum in Sierra Leone is commonly attacked by chlorosis, the plants apparently becoming affected after passing the seedling stage. Slightly affected leaves are mottled, the part along the veins being yellow, while the leaves on severely diseased shoots are yellow, and are often curled and dwarfed, with turned-up edges. Badly chlorosed leaves bear enations, frequently seen

as minute foliar structures, on the lower surface, generally over the net veins, but often over the primary branch veins or midrib. Diseased plants are stunted and do not flower. The disease appears to belong to the virus group.

Monilochaetes infuscans was found on sweet potatoes [cf. ibid., x, p. 403].

A strain of *Rhizoctonia* [*Corticium*] *solani* with large sclerotia was found on maize (apparently causing the same disease as that reported from Ceylon) [ibid., vi, p. 286] and pigeon pea. Maize was also attacked by *Sclerotium rolfsii*, which also causes a leaf spot of *Luffa cylindrica* [*L. aegyptiaca*].

Other new records include *Cercospora stizolobii* on Bengal bean (*Mucuna pruriens*), *C. melongenae* on eggplant, *C. duddiae* on onion and native shallot, and *Myriogenospora paspali* on *Paspalum scrobiculatum*.

Fifth Biennial Report Michigan Department of Agriculture for the fiscal years ending June 30, 1931 and 1932.—149 pp., 7 figs., 3 maps, 1932.

The following items of phytopathological interest occur in this report. The 1931 crop report for Michigan shows that the average wheat yield per acre was 26 bushels, the highest on record, the loss from black stem rust [*Puccinia graminis*] being less than half of 1 per cent. As the campaign for barberry eradication progresses, the number and severity of stem rust epidemics is gradually diminishing. According to the figures supplied by the Division of Barberry Eradication of the United States Department of Agriculture, the average annual loss of wheat from *P. graminis* was 57,704,000 bushels from 1916 to 1920; 17,867,000 bushels from 1921 to 1925; and 9,609,000 bushels from 1926 to 1930. During 1931 and 1932, 80,014 barberry bushes were eradicated in Michigan [*R.A.M.*, x, p. 364].

The 'red suture' disease of peaches is gaining ground in the State [ibid., xi, p. 789], the number of affected trees marked on 2,646 farms in 1931 being 1,434 as against 7 on 1,841 farms in 1930. The corresponding figures for yellows were 2,935 in 1931 (1,006 in 1930) and for little peach 18,675 (4,867).

Since 1928 the systematic removal of cultivated black currants from all counties with white pine [*Pinus strobus*] stands, against blister rust [*Cronartium ribicola*], has been in progress [ibid., x, p. 364]. The total number of bushes eradicated up to 30th June 1932 was 894,003 in the Upper Peninsula and 533,909 in the Lower Peninsula.

Division of Botany.—*Fifty-first Ann. Rept. New York (Geneva) Agric. Exper. Stat. for the fiscal year ended June 30, 1932*, pp. 31–43, 1932.

The following items of phytopathological interest, besides others already noticed from different sources, occur in this report. The necrotic effect of red mosaic on new canes of susceptible black raspberry [*Rubus occidentalis*] varieties [*R.A.M.*, x, p. 164 and next abstract] appears from the current year's observations to be correlated with cool weather rather than with growth changes as

influenced by the supply of soil moisture. The permanence of the injury depends on the degree to which the tip is affected. Resistant varieties show only a slight arrest of growth, often amounting to no more than one or two dwarfed and mottled leaves with blue-spotted petioles. In such cases the slow, insidious reduction of vigour presents a strong contrast to the rapid decline of susceptible varieties in which the growing tips are severely damaged. The Naples variety shows a marked capacity to withstand infection by red mosaic, but when the disease is contracted the symptoms are very pronounced. In a three-year-old planting the Naples stock showed a red mosaic incidence of one-tenth of that of an adjacent susceptible seedling. The Newburgh variety maintains a high record of resistance both to red and yellow mosaic.

A mosaic-like disease of strawberries [cf. ibid., xi, p. 252] is prevalent in central and western New York, and was found during the period under review in a number of Premier plantings causing 10 to 25 per cent. infection. All the runners from a diseased mother plant are affected, dwarfing and mottling of the early foliage being very conspicuous. Among the most susceptible varieties with Superb as one parent are Waite's Perfection, Aldrich, and Haverland. Rapid degeneration is a feature of the disease in the susceptible types of strawberry.

Refugee beans [*Phaseolus vulgaris*] continued to suffer severely from mosaic [ibid., xi, pp. 499, 561], promising results in the control of which have been given by roguing.

Spraying experiments against apple scab [*Venturia inaequalis*] in a Ben Davis orchard [ibid., xi, p. 788] indicated that summer applications of lime-sulphur may sometimes cause more foliage injury than the fungus [cf. ibid., xii, p. 30]. During the past three years the delayed dormant spray, given at the proper times, was the most effective of all applications.

Forty-second Annual Report Washington Department of Agriculture for the fiscal year ended June 30, 1932.—*Washington Agric. Exper. Stat. Bull.* 275, 84 pp., 1932.

The following are some of the items of phytopathological interest in this report, in addition to those already noticed from other sources. F. D. Heald, E. F. Gaines, C. S. Holton, and A. M. Schlehuber identified ten physiologic forms of *Tilletia tritici* [*T. caries*] and twelve of *T. levis* [*T. foetens*: *R.A.M.*, xii, p. 156]. Nearly 2,000 varieties and hybrid selections of winter wheat were analysed for relative resistance to one or more of nine of these physiologic forms. Infection ranging from 75 to 100 per cent. was obtained on susceptible varieties, whereas 98 resistant sorts remained free from all the nine forms. More than 300 spring wheats, mostly F_5 and F_6 segregates, were also tested for bunt resistance, the inoculum being a composite sample of 20 collections comprising all the physiologic forms available at the Station. The 11 check rows of Jenkin averaged 70 per cent. of bunted heads, while 68 of the fixed hybrids remained healthy. Of 17 oat varieties tested for resistance to covered smut [*Ustilago kolleri*: ibid., xi, p. 498], Markton was the only one to remain immune.

L. K. Jones found that the annual increase of mosaic [see pre-

ceding abstract] in the Cuthbert red raspberry amounts to some 20 per cent., while the rate of spread from red to black raspberries [*Rubus occidentalis*] is considerably more rapid. Thus, in one year the incidence of infection in a Cumberland black raspberry planting adjacent to red raspberries rose from 5 to 80 per cent. [ibid., xi, p. 381].

Cranberry bogs were severely infected during the past two years by *Sclerotinia oxycocci* [ibid., xi, p. 188], which was well controlled in D. J. Crowley's experiments by spraying with 3 per cent. lime-sulphur.

E. L. Overholser, L. L. Claypool, and F. L. Overley observed that little leaf or rosette of apple, peach, and cherry trees occurs mainly in orchards without a permanent lucerne cover crop, or where corrals for livestock were formerly situated. In no case was the disease found in orchards having a good uniform lucerne stand during the preceding three years. As in California, the injection of zinc sulphate into the base of the trunk in the late winter brings about marked recovery by midsummer [ibid., xii, p. 99].

Recent investigations have shown that the latent and vein-banding viruses of potato retain their virulence in dried plant tissues much longer than is generally believed. When combined with tobacco mosaic in tomato plants the latent virus retains its virulence for a year or more longer than when dried as a single virus [ibid., xi, p. 595].

The following are new records for the State: cane canker of roses (*Coniothyrium wernsdorffiae*) [ibid., ix, p. 721], rose bloom of azaleas (*Exobasidium azaleae*) [*E. vaccinii*: ibid., ix, p. 389], scab (*Venturia crataegi*) of red thorn (*Pyracantha coccinea*), leaf spot of peony (*Septoria paeoniae*) [ibid., iii, p. 138], and chestnut blight (*Endothia parasitica*).

Forty-fourth Annual Report of the Kentucky Agricultural Experiment Station for the year 1931.—Part I, 66 pp., 1932.

The following items of phytopathological interest occur in this report (pp. 19–22). Five mosaic tobacco plants were found among a total of some 66,600 on the Experiment Station farm three weeks after setting. By harvest time about 1 per cent. of the plants had become affected. This is the sixth consecutive year in which the disease has been almost prevented during the early part of the season by prohibiting the use of barn-cured tobacco by the men engaged in pulling and setting plants [*R.A.M.*, ix, p. 21]. Speck spot of Burley tobacco (small, circular, light brown spots) was found to be due to infection by any one of several viruses, e.g., the typical tobacco mosaics, etch, veinbanding, and cucumber mosaic [ibid., xi, pp. 334, 406, *et passim*]. As indicated by previous investigations, frenching of tobacco may apparently be due to a deficiency of nitrogen, phosphorus, or potassium in the soil [ibid., xi, p. 807]. It has not been found in soils containing large amounts of basic calcium.

Studies are in progress on a virus disease of plums which appears to cause a gradual loss of vigour and eventual death of the trees [see below, p. 230]. It has been transferred to seedling

peaches from the Abundance, Red June, October Purple, Bovay, and Shiro plum varieties. The leaves of orchard trees of the three first-named varieties showed distinct leaf patterns of the ring-spot type. The disease was found on Abundance in a nursery, where a few very typical ring-spot patterns were also detected on the foliage of Elberta peaches.

Forty-fourth Annual Report of the Indiana Agricultural Experiment Station for the year ending June 30, 1931.—87 pp., 17 figs., 1 graph, 1931. [Received November, 1932.]

The following items of phytopathological interest, in addition to those already noticed from other sources, occur in this report. Complete control of tomato leaf spot (*Septoria lycopersici*) was given by the application of Bordeaux mixture at ten-day intervals throughout the growing season, a copper-lime dust given at the same times being only partially effective [*R.A.M.*, v, p. 393]. Spraying caused a marked delay, however, in the maturation of the fruits, resulting in a considerable reduction of yield. It was experimentally shown that tomato foliage must be wet with dew or rain continuously for at least 30 hours before extensive infection by *S. lycopersici* will take place. A high degree of resistance to wilt (*Fusarium*) [*lycopersici*] was shown by the Indiana Baltimore variety.

The tomato mosaic virus [ibid., xii, p. 79] has shown a tendency to induce necrosis on a number of hosts, the effects being particularly noticeable on the Dwarf California Giant petunia, certain flowering species of *Nicotiana*, viz., *N. affinis*, *N. sylvestris*, and *N. sanderae*, and *Salpiglossis sinuata*. The first- and last-named are generally killed outright by inoculation with the virus, while the *Nicotiana* plants develop extensive dead areas on the leaves, and girdling the stem, causing the death of the upper parts.

In comparative trials of commercial strains of Golden Bantam maize and some hybrid selections resistant to bacterial wilt [*Aplanobacter stewarti*: ibid., xii, p. 78], the former showed an average of 10·7 per cent. wilt with 8·2 per cent. loss from sterility while the corresponding figures for the latter were only 0·5 and 0·3 per cent., respectively.

Selections with a high degree of resistance to leaf rust [*Puccinia triticina*] have been found among such standard soft red winter wheats as Fultz and Michigan Amber. In a further study of the effect of nutrition on the reaction of wheat to leaf rust it was found that a moderate supply of nitrogen to soils deficient in this element produced a large increase in both rust and yield; when twice the amount was given, a further increase was observed in the incidence of rust while the yield remained almost the same. Potassium combined with nitrogen resulted in a relatively high yield and a marked decline in the amount of rust. Potassium or phosphorus applied to a soil deficient in these elements resulted in an increased yield without augmenting the amount of rust.

Sooty blotch [*Gloeodes pomigena*: ibid., xi, p. 657] has been produced on young apples in a cool moist chamber by spore inoculations from cultures from twigs of *Asimina triloba*, *Xanthoxylum americanum*, *Crataegus mollis*, *C. crus-galli*, ash (*Fraxinus*

americana), plane (*Platanus occidentalis*), *Benzoin aestivale*, and *Vitis cordifolia*.

European strains of red clover [*Trifolium pratense*] have been found more resistant to mildew [*Erysiphe polygoni*: ibid., xii, p. 78] than those from the United States. Two physiologic forms of the fungus have been differentiated, of which 1 is the more prevalent while 2 has the wider host range. The mildew occurring naturally on alsike [*T. hybridum*] corresponds to form 1.

Van Hall (C. J. J.). **Cacao.**—Second edition, xviii + 514 pp., 151 figs., 14 diags., 2 graphs, 10 maps, London, Macmillan & Co., Ltd., 1932.

Chapter IX of the revised edition of this well-known work, first published in 1914, contains a discussion of the following diseases: collar crack (*Armillaria mellea*) [*R.A.M.*, x, p. 81], black root (*Rosellinia pepo*) [ibid., xi, p. 698], white, brown, and red root rots (*Fomes lignosus*, *F. lamaoensis*, and *Ganoderma pseudoferreum*), collar rot (*Ustulina zonata*) [ibid., vii, p. 565], *Sphaerostilbe repens* [ibid., ix, p. 20], canker and pod rot (*Phytophthora palmivora*) [ibid., xi, p. 703], bark rot and black spot (*Sphaeronema*) [ibid., iv, pp. 149, 529], the Surinam die-back disease [ibid., vi, p. 603], die-back and pod rot (*Diplodia* [*Botryodiplodia*] *theobromae*) [ibid., xi, p. 698], pink disease (*Corticium salmonicolor*), thread blights (*C. stevensii*, *Marasmius scandens* [ibid., x, p. 80], *M. byssicola* [ibid., vii, p. 565], and *M.* spp.), South American witches' broom (*M. perniciosus*) [ibid., xi, p. 703], Cameroon witches' broom disease (*Taphrina bussei*), and red rust (*Cephaleuros mycoidea*) [ibid., ix, p. 632].

Bunting (R. H.). **Actinomyces in Cacao-beans.**—*Ann. of Appl. Biol.*, xix, 4, pp. 515–517, 1932.

Examination of cacao beans imported from Nigeria into Amsterdam, which were affected by an objectionable, musty smell, showed the presence in them, among several other organisms, of three strains of *Actinomyces* [cf. *R.A.M.*, vii, p. 22] which cultural studies on several media proved to be responsible for the pungent odour. The percentage of the affected beans in the sample was not high, and the trouble is stated not to be of common occurrence in Nigerian cacao.

The paper includes the description by Waksman (to whom the organisms were submitted for identification) of the morphology, cultural characteristics, and biochemical properties of the three strains of *Actinomyces*; they are considered to be strains of a single species new to science, which is named *A. cacaoi* Waksman.

Garbowski (L.). **Współczesny stan badań nad rdzami Zbożowemi. (Referat zbiorowy).** [The present state of the investigations of cereal rusts. (Compilatory report).]—*Prace Wydz. Chorób Roślin Państw. Inst. Naukow. Gospod. Wiejsk. w Bydgoszczy* [*Trans. Phytopath. Sect. State Inst. Agric. Sci. in Bydgoszcz*] 12, pp. 25–88, 1932.

In this paper the author gives a very comprehensive review of

the recent literature [112 titles of which are quoted in the bibliography appended] dealing with cereal rusts [*Puccinia* spp.] throughout the world. Particular attention is given to the views expressed in regard to the specialization of the rusts, and to the geographical distribution and transmigration of biological forms; and there is a discussion of the ecological conditions that favour the development of the fungi and infection of the hosts. In the two final sections the problems of resistance and immunity, and of the control of the rusts by chemical means are dealt with at some length. Most of the information given has been noticed in this *Review* from time to time.

JOHNSON (T.), NEWTON (MARGARET), & BROWN (A. M.). **Hybridization of Puccinia graminis tritici with Puccinia graminis secalis and Puccinia graminis agrostidis.**—*Scient. Agric.*, xiii, 3, pp. 141–153, 1 pl., 1 fig., 2 diags., 1932. [French summary on p. 198.]

This is a detailed account of the authors' experiments [some of which have already been noticed: *R.A.M.*, x, p. 365] on crossings between *Puccinia graminis tritici* forms 30 and 95 and *P. g. secalis*. The four hybrid physiologic forms, 70, 104, 111, and 112, which were isolated from the F_1 generation of these crosses, proved to be low in virulence on the majority of wheat varieties tested and on rye, but their virulence to barley was about the same as that of the parent forms. Efforts to germinate their teleutospores in order to study segregation in the selfed progeny have hitherto failed.

Attempts to cross *P. g. tritici* and *P. g. agrostidis* gave negative results, except in one case, in which a haploid *P. g. tritici* pustule on barberry, to which nectar of *P. g. agrostidis* was applied, formed hybrid aecidia. The rust strain produced by these aecidia was very similar in its pathogenic properties to that of the *P. g. tritici* × *P. g. secalis* form 111, but even less virulent to wheat; barley varieties (*P. g. agrostidis* is unable to attack *Hordeum*) were either resistant or moderately susceptible to this hybrid, while *Agrostis alba* was moderately resistant.

The results of the whole work lead the authors to believe that hybrid forms of the type described may be expected to occur frequently in crosses of *P. g. tritici* with other varieties of this species.

HUBERT (K.). **Beiträge zur Züchtung rostresistenter Weizen.** [Contributions to the breeding of rust-resistant Wheats.]—*Zeitschr. für Züchtung*, A, xviii, 1, pp. 19–52, 1932.

The writer has continued the studies of Rudorf and Isenbeck [*R.A.M.*, ix, pp. 99, 514] on breeding wheat for resistance to yellow rust (*Puccinia glumarum tritici*), at the Halle Agricultural and Plant Breeding Institute, where attention was also directed to the inheritance of resistance to *P. triticina* [cf. ibid., xi, p. 564].

Greenhouse inoculation experiments were carried out with *P. glumarum* (chiefly form 2) on 100,910 plants of the progenies resulting from crosses between resistant and susceptible wheat varieties, and on 32,979 control plants (susceptible parents and

Hörning's or Krafft's Dickkopf). It was found that in crosses between the 'immune' variety Chinese 166 [ibid., xi, p. 666] or the highly resistant Chinese 165 and the very susceptible Ackermann's Bayernkönig (winter wheats), resistance to yellow rust is inherited as a dominant character. Owing to the complexity of the segregation ratios it has hitherto proved impossible to analyse the factors determining the mode of inheritance of this character, but the dominance of resistance is evidently incomplete. In the case of crosses between the highly resistant summer varieties Blausamtiger Kolben [Blue Velvet Club], Normandie, or Saumur and the very susceptible Peragis or Quax, resistance to *P. glumarum* is transmitted as a monomerous recessive character. Resistance to *P. triticina* form 15 is inherited as a monomerous dominant character in crosses between Blue Velvet Club or Normandy and Peragis. Among the F_3 progeny of the cross Blue Velvet Club and Peragis were certain individuals combining a high degree of resistance to both yellow and brown rust. In some of the progenies of crosses between resistant and susceptible varieties, resistance to *P. glumarum* has been maintained for four or five generations.

ZADE (A.). **Neue Untersuchungen über den latenten Pilzbefall und seinen Einfluss auf die Kulturpflanzen.** [New investigations on latent fungous infection and its influence on cultivated plants.]—*Fortschr. der Landw.*, vii, 21, pp. 529–532, 8 figs., 1932.

Continuing his investigations at Leipzig on the influence of the latent non-sporing type of fungous infection on cereals [*R.A.M.*, x, p. 717], the writer confirmed previous results with regard to the injurious effects of this form of attack in wheat invaded by *Tilletia tritici* [*T. caries*] and the following winter barley varieties by *Helminthosporium gramineum*: Almerfeld, Groningen, Friedrichswerth, Bürckner's, Werther's, Janetzki's, Streng's, Kalkreuth Universal, Engelen's medium-early, and Eckendorf Mammoth. The microscopic examination of sections through the lowest leaf node of wheat plants infected by *T. caries*, oats by *Ustilago avenae*, and barley by *H. gramineum* clearly revealed the hyphae of the various fungi. The external symptoms of this type of infection include the shortening of the haulms and ears, general weakness of the plants, and liability to winter injury.

On the basis of the results recorded, sporulation should not be regarded as the exclusive criterion of varietal immunity or fungicidal efficacy.

MILAN (A.). **Sul grado di accestimento delle piante di Grano colpite dalla 'carie'.** [On the amount of tillering of bunted Wheat plants.]—*Nuovo Giorn. Bot. Ital.*, N.S., xxxix, 3, pp. 603–612, 1932.

The [tabulated] results of eight years' experiments in which wheat of different varieties was inoculated with bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetens*: *R.A.M.*, xi, pp. 630, 631] either by being wounded or grown in artificially infected soil showed that severely affected plants tillered much less than

healthy or partly affected ones, but that there was little difference in this respect between the two last-named groups; thus, in one test, the average numbers of culms on healthy, partly diseased, and severely diseased plants were, respectively, 10·2, 9·5, and 7·4, the corresponding figures in two other tests being 8·4, 8, and 3·7; and 6·5, 6·2, and 3·2.

Busse (G.). **Pflanzenkrankheiten—Fruchtfolge—Düngung und Sortenfrage des Weizens.** [Plant diseases—crop rotation—manuring and the varietal problem of Wheat.]—*Deutsche Landw. Presse*, lix, 46, p. 579, 1932.

Replying to a number of correspondents on various subjects arising out of his recent paper on crop rotation and manuring [especially against *Ophiobolus graminis* on wheat: *R.A.M.*, xii, p. 19], the writer advises the cultivation of wheat following potatoes, fodder or sugar beets, lucerne, beans, vetch, oil seeds, or fallow (the two last-named being of little importance in the present-day system). In no case should wheat follow wheat or barley, and it should only succeed peas if the latter have been healthy and if the soil reaction is neutral; in most cases the application of lime is necessary. Oats may precede wheat if the field is manured between the two crops.

Meyer-Bahlburg [W.]. **Ursachen des besonders starken Halmtöterbefalls.** [Causes of the particularly severe strawbreaker infection.]—*Deutsche Landw. Presse*, lix, 47, p. 588; 48, p. 603, 1932.

The writer discusses the various soil and cultural factors contributing to the severe epidemic of the 'strawbreaker' of wheat (*Ophiobolus*) [*herpotrichus*: *R.A.M.*, xii, p. 158] in northern Germany in 1932, including the light soils of the wheat-growing districts, shallow sowing, and faulty crop rotation. The last-named should be arranged as follows: fallow, wheat, beets, oats and clover, clover-grass, wheat, beets, and barley.

Wang (Mlle D. T.). **Observations cytologiques sur l'Ustilago hordei (Pers.) Kell. et Sw.** [Cytological observations on *Ustilago hordei* (Pers.) Kell. et Sw.]—*Comptes rendus Acad. des Sciences*, cxcv, 22, pp. 1041–1044, 1932.

The writer studied the cytology of *Ustilago hordei* [*R.A.M.*, vii, p. 532] in Van Tieghem cells on 2 per cent. beer wort at room temperature (17° to 20° C.).

The first division of the double nucleus is invariably the reduction division, the diploid number of chromosomes being four and the haploid two. Nuclear division is always effected by typical mitosis.

The promycelium usually divides into three uni- rarely binucleate cells, and a basal one, continuous with the spore, united by clamp-connexions. The sporidia develop near the septa of the promycelium and are uninucleate; they multiply at first by budding and then give rise to a more or less extensively branched mycelium. Intersporidial anastomoses were observed, the nucleus passing from one cell to another.

In a solid medium of 5 per cent. beer wort with 1·5 per cent. agar a white mycelium developed in 10 to 15 days. By the end of three months the cultures had assumed a yellowish to brownish tinge, and some of the hyphae became swollen, the swollen part containing one or two nuclei. These nucleate portions became shortened, rounded, and developed a thickened membrane, their behaviour thus corresponding exactly to that of the natural chlamydospores; they are, however, paler than the latter. The fusion of the two nuclei in each cell is believed to represent a true sexual process.

WELSH (J. N.). **The effect of smut on rust development and plant vigour in Oats.**—*Scient. Agric.*, xiii, 3, pp. 154–164, 1 fig., 1932. [French summary on p. 198.]

The results of field and greenhouse experiments reported in this paper showed that, in the four oat varieties tested, infection with covered and loose smut (*Ustilago levis* [*U. kolleri*] and *U. avenae*, respectively) led to a heavier development on the plants of crown rust (*Puccinia coronata avenae*) [*P. lolii*]. The smuts increased the ratio of immature to mature tillers in the oat plants and, particularly *U. kolleri*, reduced the height and tended to decrease the tillering capacity of the plants; the latter was lowest in plants in which all the panicles were smutted, while those that were partially smutted exhibited as many, and occasionally more, tillers than normal. Tillers with smutted panicles were more heavily rusted than those from the same plants bearing non-smutted panicles, but the latter had more rust than entirely smut-free plants. Oat plants apparently harbouring the mycelium of the smuts, but showing no evidence of smutted panicles, were intermediate in stage of maturity, height, and yield between those obviously smutted and plants raised from uninoculated seed-grain. Even on the immature tillers the rust was more severe in smutted than in smut-free plants, so that the effect of smut in increasing the proportion of immature parts is not sufficient to account for the increase in susceptibility.

MUSKETT (A. E.) & CAIRNS (H.). **The effect of seed disinfection upon the Oat crop in Northern Ireland.**—*Ann. of Appl. Biol.*, xix, 4, pp. 462–474, 1932.

The results of three years' experiments in Northern Ireland showed that 1 in 320 formaldehyde solution (used either as a steep or a sprinkle) gave the best control of covered and loose smuts (*Ustilago kolleri* and *U. avenae*) of oats, closely followed by ceresan and abavit B. In the field the two last-named compounds proved more satisfactory than formaldehyde in that the crop raised from seed grain dusted with either of them (at the rate of 3 oz. per bushel) on the average yielded about 30 per cent. more than the formaldehyde plots. It is believed that their greater efficiency is due to the fact that they are retained by the grain at the time of sowing, and remain operative during the early stages of the development of the seedlings. They have the further advantage over formaldehyde that the grain may be treated with them well

in advance of the time of sowing, without any injury to the crop. No cases of poisoning were observed to result from their use.

Sprinkling the seed-grain with copper sulphate or dusting it with copper carbonate caused definite injury to the crop, while sulphur or gypsum, used as dusts, had no fungicidal value.

LUTHRA (J. C.). **India: some fungal diseases of farm crops recently discovered in the Punjab.**—*Internat. Bull. of Plant Protect.*, vi, 11, pp. 181–182, 1932.

Colletotrichum graminicolum, the causal organism of red leaf spot of sorghum [*R.A.M.*, v, p. 656], has been found to be carried on the seed.

FAWCETT (H. S.). **Citrus brown rot control.**—*California Citrograph*, xviii, 1, pp. 3, 31, 1932.

The citrus brown rot fungus (*Phytophthora citrophthora*), recently found for the first time in Florida and Louisiana [*R.A.M.*, xi, p. 779], produces germ-tubes in films of water which penetrate the rind of the fruit and set up brown rot a few days later. It also attacks some of the lower leaves, which it causes to drop. As far as is known, no new spores are formed on the fruits or leaves unless films of water are present. Once the affected surfaces are dry they cease to be a source of spread, so that new infections must then await another rainy period, which will furnish conditions in which viable spores will be splashed from the soil or flipped from a wet leaf to a fruit. In California, this species as well as the other brown-rot fungi *P. parasitica* [see next abstract] and *P. hibernalis* attack the fruit in the same manner. The last-named, however, requires cold weather (about 50° F.), as in Western Australia; it attacks orange leaves readily, and frequently causes heavy defoliation near the soil, or higher if it attacks after winds accompanying or just following rain. Notes are given on control by the Californian method [ibid., viii, p. 640; xi, p. 779].

TOXOPEUS (H. J.). **Nadere gegevens over de gomziekte in Djeroek manis (Citrus sinensis Osb.) en haar bestrijding.** [Further data on the gum disease of Djeroek manis (*Citrus sinensis* Osb.) and its control.]—*Meded. Inst. voor Plantenziekten* 80, 27 pp., 1 diag., 2 graphs, 1 map, 1932. [English summary.]

From 1929 to 1931 numerous experimental observations were made in connexion with the control of gummosis of sweet oranges (*Phytophthora parasitica*) in Java [*R.A.M.*, ix, p. 647].

It has been found that the incidence of infection may be greatly reduced by keeping the stem base and the surrounding soil dry. Trees up to about five years old are not so liable to infection as older ones, the reason probably being that they cast no shadow round the stem base and the fungus consequently succumbs to the high soil temperatures. Between the age of five and ten years attacks of gummosis are liable to be very severe, the stems being sufficiently slender to be ringed by one or two large lesions. The more extensive development of *P. parasitica* on the 'pelataran' (the trampled portion of the garden surrounding the house) is

attributed to the greater water-holding capacity and lower temperature of the uppermost soil layer in such places, while after rain large pools are formed in which sporangia and zoospores are produced in abundance. No difference was observed in the incidence of the gum disease in irrigated and non-irrigated gardens. Irrigation in the dry season at infrequent intervals is apparently inadequate to prevent the inhibition of growth of the fungus by high temperatures and drought, and the spread of infection on the tree is also much retarded in the dry monsoon. Tables are given showing the different amounts of infection on trees of varying diameter in seven villages.

Curative treatment consists in the excision of the diseased bark together with a surrounding strip of 1 cm. of the sound cortex, and covering the wound with a layer of paraffin mixed with carbolineum plantarium [ibid., x, p. 557]. The trees should be inspected monthly so that treatment may be commenced at an early stage. In 25 out of 179 trees disinfected by this method the fungus reappeared at the edge of the wound after periods ranging from one to eight months. A month after treatment the average breadth of the wounds is reduced from 5 to 3 cm. and within a year, in successful cases, complete healing takes place. For larger wounds at least two years are required for the overgrowth of the diseased area by healthy cortex. The frequency of infection shows a sharp periodicity, culminating in the spring or early summer; in general, the disease is little in evidence from July to December, so that in some cases treatment may profitably be restricted to the wet monsoon. Considerable benefit was derived from painting the stem base with tar from 5 cm. below to 50 cm. above soil level, one application being made at the beginning of the wet season and another in the middle of it. Trees that are almost ringed may be saved by inarching Japanese citron [*Citrus medica*] seedlings above the wound; this practice would probably also be generally beneficial to orange trees with a stem circumference of over 20 cm. by diminishing their liability to severe attacks of gummosis.

FAWCETT (H. S.). **Diaporthe citri (Faw.) Wolf, the perfect stage of Phomopsis citri and P. californica.**—*Phytopath.*, xxii, 11, p. 928, 1932.

The perfect stage of *Phomopsis californica* [*R.A.M.*, xii, p. 89] has been studied and found to be indistinguishable from *Diaporthe citri* described by Wolf as that of *P. citri* [ibid., vi, p. 159]. The writer has further examined numerous isolations made by R. G. Tomkins, of Cambridge, from fruits from Palestine, South Africa, Brazil, Spain, Florida, and elsewhere, and no characteristic differences warranting the separation of these isolations from the Californian could be detected. Certain isolations sent by K. Nakata from Japan also appear to be identical, so that the species would seem to be of world-wide distribution. The occurrence of melanose is believed to depend largely on climatic conditions, this manifestation of the fungus being much more prevalent in Florida than in California or Palestine.

PETRI (L.). **L'applicazione della terapia interna contro il 'mal secco' dei Limoni.** [The application of internal therapy against 'mal secco' of Lemons.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 2, pp. 236–237, 1932.

Since 0·5 per cent. uspulun-universal was applied in 1930 to the base of lemons grafted on bitter orange at Messina in an attempt to prevent infection by the organism causing 'mal secco' disease (*Deuterophoma tracheiphila*) [*R.A.M.*, xi, pp. 174, 175] through internal absorption of mercury, the trees have remained healthy.

Quantitative analysis showed only very minute traces of mercury in the leaves of the treated trees and very little more in the woody tissues of the twigs, in the expressed juice of which *D. tracheiphila* was able to live. No definite conclusions can safely be drawn from these experiments as yet.

RABINOVITZ-SERENI (D.). **Ricerche biologiche sulla Rhizoctonia dei semenzai di Citrus.** [Biological researches on the *Rhizoctonia* of Citrus seed-beds.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 2, pp. 187–209, 4 figs., 1 graph, 1932.

Investigations into the biology of *Rhizoctonia* [*Corticium*] *solani* isolated from bitter orange seedlings [*Citrus aurantium* var. *bigaradia*] grown from seed obtained from Eritrea and killed by the fungus just after germinating (stated to be the first record of *C. solani* on citrus seedlings in Italy) [cf. *R.A.M.*, viii, p. 235; x, p. 24], showed that the minimum growth temperature was 10° C., the maximum 40°, and the optimum between 20° and 25°. The growth rate was the same in light and darkness. Growth occurred on media of P_H 2·8 to 9·8, the optimum being P_H 7 [cf. ibid., i, p. 202]. A small quantity of acids was produced during growth. Commercial copper and sulphur fungicides did not inhibit growth, which was, however, completely arrested by uspulun (1 in 500), tillantina (1 in 500), and granosan [ibid., xii, p. 140] (1 in 25,000), and almost completely by mercuric chloride (1 in 25,000). Granosan is regarded as an excellent disinfectant for wheat, oats, barley, and cotton seed. Inoculations of two-year-old bitter orange seedlings gave negative results.

A bibliography of 32 titles is appended.

SAVASTANO (G.) **L' endoxerosi del Limone in Sicilia.** [Endoxerosis of the Lemon in Sicily.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 2, pp. 169–186, 2 pl., 1932.

Under Sicilian conditions, internal decline of lemons [*R.A.M.*, x, p. 376], known locally for fifty years but not hitherto mentioned in Italian phytopathological literature, occurs regularly between May and September with an intensity dependent on the prevailing weather. The characteristic symptom is a chestnut discoloration of the fibrovascular bundles, most conspicuous along the axis of the placenta near the stem end, where a reddish tinge is sometimes discernible. Green, mature, and senescent fruits are all susceptible, severe attacks causing premature dropping even of the first-named. The condition may be recognized by removing the stalk and noting the discoloured bundles. Mature affected fruits generally float stem end up in water. The condition is less serious

than in California, as it is less favoured by the climate of Sicily and occurs when much of the crop is unripe and therefore less susceptible.

Gum is present in the tissues of the placenta [cf. ibid., ii, p. 406], producing the chestnut discoloration, as well as along the whole length of the fibrovascular bundles, where it occurs in irregular, intermittent patches wholly or partly obstructing the lumen of the vessels. Zones of gummy occlusion are also found in the xylem of the stalk.

The attacks are limited almost exclusively to lemons grown for the early summer market, occasional attacks on later crops being associated with compact soil or injured roots. Trees badly attacked by gummosis are more susceptible than others. Very light soils deficient in organic material also conduce to the condition [cf. ibid., x, p. 377].

The physiological factors inducing an attack are (1) excessive transpiration during hot, dry periods, (2) the drawing away of water from the fruits towards the leaves, and (3) the inability of the roots to supply the leaves with sufficient water, either because of deficient soil humidity or because of too great a difference between air and soil temperature.

To control the disease it is recommended that the first spring irrigation should be delayed until really required. The annual forcing of early summer lemons should cease, the cultural practices involved enormously increasing the risk of an attack. Irrigation must be very carefully suited to the soil, and when the hot winds prevail the trees should be given more water. Organic manures should be applied to sandy soils. Susceptible orchards should be protected by windbreaks. If attacks are frequent in hot, dry weather a large proportion of the fruits should be picked irrespective of size, otherwise the whole crop may be lost.

In order not to reduce the value of the consignments, affected fruits should not be exported.

[Young (W. J.) & Read (F. M.).] **Citrus Preservation Committee —Progress Report (October, 1932.).**—*Journ. Australian Council Sci. & Indus. Res.*, v, 4, pp. 201–204, 1932.

In tests conducted over a period of four years in Australia, washing with 5 per cent. borax or 2·5 or 5 per cent. sodium bicarbonate did not prolong the life of navel oranges in cool storage [cf. *R.A.M.*, x, p. 728; xi, p. 105]. Washing Valencia oranges with borax reduced *Alternaria* stem-end rot [*A. citri*: ibid., ix, p. 775], but sodium bicarbonate did not consistently do so. Coating navel oranges with paraffin wax after washing was of no advantage except in improving their appearance, heavy applications actually shortening the life of the fruit. On Valencia oranges the paraffin did not cause premature collapse and usually reduced skin browning. Paraffin spraying was almost as effective as borax in reducing stem-end rot; the best treatment consisted in borax followed by a paraffin spray. The experimental Valencia oranges when carefully handled remained in good commercial condition without any treatment for three months, and it was only then that wastage due to *A. citri* set in. Navel oranges, on the other

hand, cannot be safely kept in cool storage beyond about five weeks. The treatment greatly improved the appearance of dirty navel and Valencia oranges.

NEAL (D. C.) & WESTER (R. E.). **Effects of anaerobic conditions on the growth of the Cotton-root-rot fungus, Phymatotrichum omnivorum.**—*Phytopath.*, xxii, 11, pp. 917–920, 1 fig., 1932.

The growth of *Phymatotrichum omnivorum*, the causal organism of cotton root rot in Texas, was found in laboratory experiments to be inhibited by anaerobic conditions and considerably restricted by concentrations of carbon dioxide exceeding 25 per cent. [*R.A.M.*, xi, p. 640]. It is, however, not killed in an atmosphere of 100 per cent. nitrogen or carbon dioxide and growth is soon resumed on its return to aerobic conditions. Possibly the aerobic requirements of the fungus may explain the differences in root rot infection observed in cotton fields following such treatments as subsoiling, fallowing, or fallow combined with deep tillage. Subsoiling infested areas in the late summer or early autumn may provide the necessary aeration for sclerotial germination, thereby reducing the chances of winter survival of the fungus. The recurrence of the disease in areas kept in clean fallow for three or four years may be due to the anaerobic conditions of the subsoil in the highly calcareous, black waxy lands of Texas, as well as to deep-seated infections in tree roots below the plough sole.

PETCH (T.). **A list of the entomogenous fungi of Great Britain.** —*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 170–178, 1932.

This is an annotated list of 54 species of entomogenous fungi occurring in Great Britain, some of which were recorded for the first time in 1930 and 1931 [cf. *R.A.M.*, xi, p. 640]. It includes a few species considered to be new to science, Latin diagnoses of which are appended, and terminates with brief notes on *Melanospora parasitica* and *Sporotrichum isariae* which were found parasitizing *Cordyceps militaris* and *Isaria farinosa*, and *I. farinosa*, respectively.

REYES (G. M.). **An unreported fungous disease of the Philippine migratory locust.**—*Philipp. Journ. of Sci.*, xlix, 3, pp. 407–418, 5 pl., 1932.

In September, 1929, migratory locusts (*Locusta migratoria* var. *migratorioides*) at the Alabang locust laboratory were heavily infested by *Beauveria globulifera* [*R.A.M.*, vi, p. 610], said to be reported for the first time from the Philippines. Diseased insects suffer from loss of appetite, weakness, and muscular paralysis ending in death. On dissection the affected insects were found to contain hyphae in the air cavities of the thorax, and in the thoracic and abdominal tissues, while mycelial tufts emerge from certain parts of the body and extend over the chitinous integument. The most conspicuous external feature of the disease, however, is the presence of a cottony-white, floccose growth, protruding from the junctures of the body segments and the joints of the legs. Later these white mycelial masses sporulate heavily and

assume an ivory or creamy tint. The diseased insects become mummified, the fungus covering practically the whole carcass.

The fungus was readily isolated on potato glucose agar and proved to be highly pathogenic to the locusts, especially to young and newly moulted individuals. *B. globulifera* was still viable after 295 days at room temperature (28° to 32° C.) and after 320 in the ice box (13° to 15°); steamed glutinous rice was found to constitute a particularly suitable medium for its growth.

Reyes (G. M.). **Artificial infection of the Coconut leaf miner with Beauveria globulifera (Spegazzini) Picard.**—*Philipp. Journ. of Sci.*, xlix, 3, pp. 419–441, 5 pl., 1932.

An investigation was made of the practicability of introducing the fungus *Beauveria globulifera*, isolated from migratory locusts (*Locusta migratoria* var. *migratorioides*) [see preceding abstract], into the regions of the Philippines infested by the coco-nut leaf miner (*Promecotheca cumingii*) [*R.A.M.*, xi, p. 780]. The best results in the artificial inoculation experiments (67·4 per cent. infection in the field and 73·2 per cent. in the greenhouse) were given by spraying the coco-nut leaf beetles with a spore suspension of the fungus during their feeding on the foliage. The fungus showed no tendency to infect the minute hymenopterous parasites of the leaf miner larvae.

Jacobson (H. P.). **Fungous diseases: a clinico-mycological text.** —ix + 314 pp., 153 figs., London, Baillière, Tindall & Cox 1932.

The author's aim in this monograph is to present to medical students and practitioners 'a comprehensive, concise, and readable discussion of the subject of clinical mycology', based on his experience as attending dermatologist to the Los Angeles County General Hospital. The work is divided into sections on the dermatomycoses (defined as primary cutaneous mycoses with usually no definite systemic involvement); and the following conditions frequently accompanied by systemic involvement: moniliasis, maduromycosis (mycetoma), sporotrichosis, blastomycosis, actinomycosis, coccidiosis (California disease, coccidioidal granuloma due to *Coccidioides immitis*) [*R.A.M.*, xii, p. 171], torulosis, and aspergillosis. Each section is followed by a bibliography of relevant literature.

Acton (H. W.), Pasricha (C. L.), Roy (A. C.), & Das Gupta (S. M.). **A new vegetable culture medium made from the papain digest of Mung Dâl (Phaseolus mungo), green variety.**—*Indian Med. Gaz.*, lxvii, 11, pp. 619–623, 1932.

A method is described for preparing a pure vegetable culture medium by digesting green mung dâl (*Phaseolus mungo*) with papain at a temperature of 60° to 65° C. for four hours. The broth has proved more satisfactory for the cultivation of the intestinal bacteria and bacteriophage than mutton broth or peptone water, while solid media prepared from the broth give a very good growth of various common fungi pathogenic to man.

KHOURI (J.) **Sur une Monilia isolée des crachats d'un malade atteint de blastomycose pulmonaire : Monilia aegyptiaca.** [On a *Monilia* isolated from the sputum of a patient suffering from pulmonary blastomycosis: *Monilia aegyptiaca.*]—*Comptes rendus Soc. de Biol.*, cxi, 33, pp. 419–420, 1932.

From the sputa of a patient suffering from an acute attack of pulmonary blastomycosis which terminated fatally, at Alexandria, the writer isolated a fungus characterized by creamy-white colonies on Sabouraud's agar, on which spherical or ovoid elements (3 to 8, average 5 μ) developed. The best growth occurred between 36° and 37° C. The organism, which was identified as a species of *Monilia* related to *M.* [*Candida*] *tropicalis* [*R.A.M.*, xi, p. 373] and *M. pulmonalis*, is named *M. aegyptiaca.* It is Gram-positive, fermenting the majority of sugars, sometimes with gas formation, but not liquefying gelatine or coagulated serum. Inoculation experiments on guinea-pigs and rabbits resulted in loss of weight and temporary debility.

CERRI (LAURA). **L'Oospora D'Agatae Sacc. è sinonimo di Torula sacchari Corda.** [*Oospora d'agatae* Sacc. is a synonym of *Torula sacchari* Corda.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV[a], iii, pp. 167–173, 1932.

From a comparative systematic study the author concludes that *Oospora d'agatae* isolated by D'Agata from a human dermatomycosis is identical with the earlier described *Torula sacchari* [*R.A.M.*, xi, p. 572]. The conidia of the genus *Oospora* are hyaline or bright and are never dark, whereas those of the genus *Torula*, and of *T. sacchari* Corda in particular, were, in all the cultures examined by the author, yellowish or dark. Notes are given on the morphology and cultural characters of the fungus.

DAVIDSON (A. M.) & GREGORY (P. H.). **Note on an investigation into the fluorescence of hairs infected by certain fungi.**—*Canadian Journ. of Res.*, vii, 4, pp. 378–385, 1 pl., 1 fig., 1932.

The conclusion reached by the writers as a result of further studies on the fluorescence of human hairs infected by *Achorion schoenleini*, *Microsporon audouini*, and *M. felineum* [*R.A.M.*, xii, p. 23] is that this phenomenon is due to some change in the hair substance following fungal invasion. Only that part of the hair actually penetrated by the hyphae is fluorescent. It appeared possible that the hyphae excrete an enzyme into the surrounding tissue, and some product of hydrolysis of the keratin or other body present in the hair may be the fluorescent substance.

Details are given of experiments in which a vivid green fluorescent substance was extracted with warm water from hairs infected by the above-mentioned organisms. Repeated attempts to extract a similar substance from hairs infected by species of *Trichophyton*, e.g., *T. gypseum*, *T. album*, and *T. violaceum*, or by normal hair, gave negative results. The bluish-white fluorescence of some *Trichophyton*-infected hairs, therefore, is not due to the same substance as in the hairs infected by *Achorion* or *Microsporon.*

Davidson (A. M.) & Gregory (P. H.). **A case of kerion celsi associated with ringworm of the eyelashes and accompanied by a trichophytid.**—*Canadian Med. Assoc. Journ.*, xxvii, 5, pp. 485–487, 3 figs., 1932.

Two cases of kerion celsi associated with *Trichophyton album* [*R.A.M.*, xi, p. 783 and preceding abstract] are reported, one being also accompanied by lesions of the eyelids. The source of infection is believed to have been cattle. The fungus, which is characterized by white colonies, concatenate spores 4 to 6 μ in diameter, and chlamydospores 15 to 20 μ in diameter, is stated to have been encountered on five patients at Winnipeg during the past two years. *T. album* is better adapted to parasitic life in the human body than are the more superficial species of dermatophytes, e.g., *T. violaceum*, as indicated by the comparatively violent physical reactions and also the more extensive growth of the organism in blood serum than on Sabouraud's medium.

Ferrari (Angela). **Ricerche sul Cryptococcus metaniger Cast.** [Researches on *Cryptococcus metaniger* Cast.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV[a], iii, pp. 175–184, 3 figs., 1932.

From a study of morphological and physiological characters the author concludes that *Cryptococcus metaniger* Castellani [found in 1926 associated with a human mycosis] should be transferred to the genus *Cladosporium*; she renames the organism *C. metaniger* (Cast.) Ferrari. A Latin diagnosis is given.

Nakamura (T.) & Takatsuki (S.). **Über einen Fall von Acremoniose.** [On a case of acremoniosis.]—*Japanese Journ. of Dermatol.*, xxxii, 11, pp. 1100–1108, 13 figs., 1932. [Japanese, with German summary on p. 125.]

From a human tumour, the size of a sparrow's egg, the writers isolated a fungus characterized on Sabouraud's agar by greyish-white, later blackish-grey, radial colonies with brownish-white, setose outgrowths in the centre. The conidia are borne successively at the apex of conidiophores arising from the branched, septate mycelium, and thus resemble those of *Cephalosporium* except that the spores are not collected into a head. The fungus, which was pathogenic to laboratory animals, is classified as a new species of *Acremonium*, *A. keio*, allied to *A. potronii*.

Macy (H.), Coulter (S. T.), & Combs (W. B.). **Observations on the quantitative changes in the microflora during the manufacture and storage of butter.**—*Minnesota Agric. Exper. Stat. Tech. Bull.* 82, 36 pp., 1932.

Data relating to the moulds (excluding yeasts and bacteria) in a typical Minnesota creamery showed that the cream on arrival contained usually between 10 and 1,000 moulds per c.c., but that pasteurization destroyed them all, as well as from 88·98 to 100 per cent. of the yeasts and from 94·20 to 99·99 per cent. of the bacteria. The number of micro-organisms in the raw cream was found to be highest in summer months, contamination by moulds being specially prevalent at harvest time when much dust is present in the atmosphere. In this connexion attention is drawn to the

necessity for proper ventilation and frequent painting to retard mould growth on walls and ceilings, as well as for the elimination of overhead piping or other obstructions liable to collect dust. The churn was shown to cause the greatest contamination of the butter by moulds [*R.A.M.*, xi, p. 181]. Moulds, yeasts, and bacteria in unsalted butters showed a marked tendency to increase during storage, whereas there was a decline in the numbers of micro-organisms in most of the stored salted samples. The higher the salt content of the butter, the greater was its effect on the yeast and bacterial counts, but this did not invariably hold good for the moulds.

Demeter (K. J.) & Mossel (H.). **Zur Bekämpfung der Braunfleckigkeit von Camembert-Käse (Erreger: Penicillium bruno-violaceum Biourge).** [On the control of the brown spotting of Camembert cheese (causal organism: *Penicillium bruno-violaceum* Biourge).]—*Milchwirtschaftl. Forsch.*, xiii, 2–3, pp. 248–262, 1932.

Numerous complaints having been received from various parts of Germany regarding the prevalence of a brown spotting of Camembert cheese, investigations were conducted at the Munich Technical College on the control of the causal organism, *Penicillium bruno-violaceum*. The chief source of contamination appears to be the rennet extract used in the preparation of the cheese, so that the foremost preventive measure is the preservation of this extract from moulds and yeasts. Other precautions should include the weekly fumigation of the cheese-making rooms with sulphur for five to six hours; frequent disinfection of all vessels, &c., with 0·3 per cent. hot caporit [*R.A.M.*, ix, p. 803]; ventilation by means of a Delbag-Absolut-Filter installation; avoidance of over-salting; and heavy inoculation of the cauldron milk with the proper mould cultures obtained from a reliable source (200 to 300 c.c. per 1,000 l. milk).

Bolley (H. L.) & Manns (T. F.). **Fungi of Flaxseed and Flax-sick soil.**—*North Dakota Agric. Exper. Stat. Bull.* 259 (Technical), 57 pp., 9 pl., 9 figs., 1932.

Several fungi have been found associated with flax wilt and soil 'sickness' in the authors' investigations at Fargo, North Dakota, of 70 American and European flax seed samples, the most important being *Fusarium lini* from the United States, Canada, Russia, Austria, and Holland [*R.A.M.*, xii, p. 95]; *F. russianum* Manns n. sp. from Russia, Austria, Canada, and the United States; *Colletotrichum lini* Manns and Bolley n. comb. (syn. *Gloeosporium lini* Westerdijk and *C. linicolum* Pethybridge and Lafferty) [ibid., x, p. 597 *et passim*] from Holland, Austria, Russia, Canada, and the United States; and *Alternaria* sp. from Austria, Russia, Holland, Canada, and the United States.

F. russianum is characterized by irregularly branched hyphae, averaging 2 μ in diameter; cream-coloured, erumpent sporodochia; short, branched conidiophores; and fusiform to crescent-shaped, 3- to 7- (usually 5-) septate conidia, 35 to 50 by 4 to 5 μ; the colonies produced on 2 per cent. glucose agar and potato plug are

port-wine coloured. The fungus is parasitic on flax, causing seedling wilt and shrivelling of the seed in maturing plants. It is seed-borne and a common agent of 'sickness' in flax soils, often in conjunction with *F. lini*.

F. terrestris Manns n. sp. was isolated in profusion from flax-sick soil but has so far given no evidence of pathogenicity in inoculation tests. It has irregularly branching hyphae, averaging 2·5 μ in diameter; slender conidiophores 5 to 10 μ long; hyaline, fusiform to crescent-shaped, 3- to 7- (usually 5-) septate conidia, 30 to 48 by 3·5 to 5 μ (average 40 by 4 μ); spherical chlamydospores 10 to 15 μ in diameter: and a sterile body, 25 to 30 μ in diameter, formed at the tips of the hyphae.

C. lini is stated to have been originally described by T. F. Manns in an unpublished thesis in 1903. Bolley's *C. lini* of 1910 is a *nomen nudum* and Miss Westerdijk's transference of the fungus to *Gloeosporium lini* (1916) is not accepted by the writers. *C. linicolum* Pethybridge and Lafferty being identical with *C. lini*, it is claimed that the name conferred on the organism by Manns in 1903 should take priority [cf. ibid., iv, p. 219]. *C. lini* is characterized by subhyaline to dark or fuliginous, abundantly septate hyphae, averaging 3·5 μ in diameter; bi- to triseptate, dark brown setae, 70 to 130 μ in length; biguttulate, hyaline, allantoid conidia, 15 to 20 by 2 to 4·5 μ; and olive to brown, spherical or oval chlamydospores, 10 to 12 by 10 to 15 μ.

All types of seed-borne spores on flax may be readily obtained by centrifuging at about 2,000 revolutions per minute. The pathogenicity of the organisms (which are carried on some 80 per cent. of north-western seed samples) was tested by inoculating graded and treated flax seed, planted and grown in sterile soil. Several of the fungi under discussion cause shrunken spots or streaks on the seed coats and injury to the seed leaves on which they are apparent when the cotyledons emerge from the testa.

F. lini (the most destructive and widespread flax parasite) penetrates the soil to a depth of at least 12 inches, but occurs most abundantly at depths not exceeding 5 inches. Under continuous cropping of flax in 'sick' soil, up to 45,000 colonies of this organism may be obtained per gm. of soil. No evidence was available in the authors' investigations that *Asterocystis radicis* [ibid., xi, p. 182] is responsible for any type of flax 'sickness'. The sandy loam soils so well adapted to flax raising appear to be very favourable to the fungi causing 'sickness', the control of which can only be effected by lengthy rotations, careful seed cleaning, grading, and disinfection with formaldehyde (2 in 1,000), and the development of immune or resistant varieties. The incidence of soil infection may also be reduced by the application of well-composted farmyard manure containing flax straw.

Peltier (G. L.) & Schroeder (F. R.). **The nature of resistance in Alfalfa to wilt (Aplanobacter insidiosum L. Mc.)**—*Nebraska Agric. Exper. Stat. Res. Bull.* 63, 28 pp., 12 pl., 1932.

Numerous sections of lucerne plants of various ages in different stages of wilt disease (*Aplanobacter insidiosum*) [*R.A.M.*, xi, p. 787] have been examined and interpreted in the light of

evidence obtained in five years' intensive field and greenhouse studies in Nebraska, both naturally and artificially infected material being used.

One of the most striking differences between susceptible and resistant varieties was found to be the relative diameter and construction of the xylem elements in the roots. Thus, in the resistant Turkestan the vessels are not only much smaller than in the susceptible varieties, e.g., Grimm and Arizona, but they appear angular with heavy wall thickenings, which are absent from the secondary and tertiary walls of the susceptible sorts. The vessels of resistant varieties reach maturity more rapidly than those of susceptible ones. In the susceptible Grimm the vessels consist of fairly long cells from which the cross septations have disappeared, so that no obstruction is offered to the passage of the bacteria. In Turkestan, on the other hand, the vascular cells are shorter and larger vestiges of the cross walls remain to constitute a barrier to bacterial penetration. The radial spread of the bacteria is also much more rapid in roots with the bundles loosely arranged in single rows (Arizona) than in those where the vessels occur in groups more or less surrounded by wood fibres, the latter being composed of insoluble lignin and therefore impenetrable by the organisms. In the susceptible Arizona variety the parenchymatous tissue (wood rays) is often in direct contact with the vessels, a phenomenon seldom observed in the resistant sorts owing to the presence of the surrounding wood fibres. Moreover, the walls of the medullary ray cells of the resistant varieties seem to be relatively heavier and with smaller intercellular spaces than those of the susceptible ones.

Rapidly growing lucerne varieties have generally been found susceptible to wilt, while those developing more slowly are resistant. The rate of growth seems to be associated with certain of the structural peculiarities favouring either resistance or susceptibility to the parasite indicated above. The moisture content of the soil, however, may be so adjusted as to modify the natural root structure and growth rate very considerably and thereby to induce comparative resistance in susceptible varieties and relative susceptibility in resistant ones.

The curtailment of organic food reserves in the roots of diseased plants bears an important relation to wilt development, and may be due to the disturbance of the photosynthetic and food storage activities. Starch was observed to be practically absent from the medullary ray and wood parenchyma cells of diseased Grimm and Turkestan plants, whereas it filled the corresponding cells of healthy plants.

Sampson (Kathleen). **Observations on a new species of Olpidium occurring in the root hairs of Agrostis.**—*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 182–194, 3 pl., 5 figs., 1932.

This is a detailed account of the morphology and cytology of a species of *Olpidium* which was found causing apical swellings of the root hairs of *Agrostis stolonifera* in Yorkshire, and more rarely occurring in the base of the hairs or in other epidermal cells. The organism is described as a species new to science under

the name *O. agrostidis*, and English and Latin diagnoses are appended. It is characterized by oval to elongated zoosporangia, 30 to 68 by 10 to 23 μ, with 1 to 4, usually short, tubes of discharge; colourless, subglobose, 1-ciliate zoospores, about 2·2 μ in diameter; and solitary or aggregated, elliptical or ovoid, smooth, hyaline, thick-walled resting spores, 20 to 30 by 9 to 17 μ in diameter. The latter are invariably binucleate to a mature age, suggesting that they arise from the copulation of zoospores.

Downes (A. C.). **Black spot of Roses.**—*Gard. Chron.*, xcii, 2394, pp. 358–359, 1932.

An account is given of the writer's attempts to control black spot of roses [*Diplocarpon rosae*: *R.A.M.*, xii, p. 25] in his Surrey garden, where the disease occurs in a severe form on the sweet-briars Lady Penzance and Rose Bradwardine, the pillar varieties Allen Chandler, Paul's Scarlet Climber, Pax, Vanity, and Phyllis Bide, and the garden roses Mrs. Oakley Fisher, Mabel Morse, Mrs. Campbell Hall, Ophelia, Madame Butterfly, Mrs. Henry Morse, Lady Pirrie, Los Angeles, Mrs. Henry Bowles, Madame Abel Chatenay, Mrs. C. V. Haworth, Lady Roundway, Golden Emblem, and the ordinarily resistant Shot Silk. All these varieties are of the paler type of colouring. *Rosa nitida*, *R. moyesii*, *R. hugonis*, *R. lucida*, *R. giraldii*, *R. sericea*, *R. omeiensis*, *R. complicata*, *R. macrophylla*, *R. nuttalliana*, *R. pisocarpa*, *R. rubrifolia*, and Pink China appear to be immune, while Mermaid, George Dickson, Wilhelm Kordes, and (in the current year) Hoosier Beauty and G. J. Glassford are resistant. The disease has been held in check by the systematic application of ammonium polysulphide and nicotine soap at about twice the strength recommended [usually ½ gall. A.P.S. to 100 galls.] against mildew [*Sphaerotheca pannosa*: ibid., iv, p. 299].

Pethybridge (G. H.) & Smith (K. M.). **A suspected virus disease of zonal Pelargoniums.**—*Gard. Chron.*, xcii, 2395, pp. 378–379, 2 figs., 1932.

From several parts of England zonal pelargoniums [*Pelargonium zonatum*] of the King of Denmark and Paul Crampel varieties have been submitted for examination to the Plant Pathological Laboratory of the Ministry of Agriculture on account of leaf curl and chlorosis [*R.A.M.*, xi, p. 649]. Round Cambridge the disease is so common that it was impossible to procure absolutely healthy plants for experimental purposes except by raising them from seed.

The young leaves first develop pale spots that gradually expand into rounded, stellate, or dendritic blotches of a bright yellow colour, often surrounded by one or more concentric rings of a lighter shade. Later the lesions become necrotic, the tissues shrivelling and turning brown, but growth in the neighbouring parts of the lamina continues, giving the leaf a crinkled and puckered aspect, sometimes accompanied by splitting. In severe cases the whole plant becomes malformed and degenerate. Temporary recovery is a striking feature of the disease.

The symptoms and course of this disturbance being strongly

suggestive of a virus, investigations were begun and are still in progress at the Virus Research Station of the School of Agriculture, Cambridge. Scions from diseased plants were grafted on to healthy stocks raised from seed, the young leaves of which developed the above-mentioned symptoms in thirty to forty days. Transmission by artificial inoculation has hitherto been unsuccessful except in one or two doubtful cases, and so far no evidence is forthcoming that insects may be involved.

Brown (Nellie A.). **Another gall-forming bacterium.**—*Phytopath.*, xxii, 11, pp. 924–925, 1 fig., 1932.

Grafted plants of *Gypsophila paniculata* in a New Jersey nursery were destroyed in 1932 by a soft, nodular gall of the type associated with the pocket disease of sugar beets (*Bacterium beticola*) [*R.A.M.*, x, p. 424]. The tumours ranged from ½ to 3 cm. in diameter and were sound and creamy-white, with water soaked areas, when cut across. The causal organism is a motile rod with bipolar flagella, capable of growth at very high and very low temperatures. Inoculation experiments gave positive results on *G. paniculata* but failed to produce infection on sugar beets, *Ricinus* [*communis*], *Bryophyllum*, tomato, and garden balsam [*Impatiens balsamina*]. The bacterium under observation appears to be distinct from any of the known gall-forming organisms, but further morphological studies are required to ascertain definitely that it is not related to *Bact. beticola.*

Gregory (P. H.). **The Fusarium bulb rot of Narcissus.**—*Ann. of Appl. Biol.*, xix, 4, pp. 475–514, 1 pl., 2 graphs, 1932.

This is a detailed account of the author's investigation of the rot of narcissus bulbs associated with *Fusarium bulbigenum* [*R.A.M.*, ix, p. 623; x, p. 795], the symptoms of which in stored bulbs and in the field are briefly described. Isolations from diseased stored bulbs yielded two strains of this species [the cultural characters of which are described] in the majority of cases, among many other organisms, including two strains of *F. moniliforme* [*Gibberella moniliformis*] and one of *Cylindrocarpon radicicola* [loc. cit.] which came next in order of frequency and a description of which in culture is also included.

Typical symptoms of the storage rot were reproduced by inoculating healthy narcissus bulbs through wounds with both strains of *F. bulbigenum*, which was readily recovered. The fungus was apparently unable to penetrate the tissues in the absence of wounding, and inoculation of the roots failed to produce infection. On the other hand, inoculations with *G. moniliformis* and *C. radicicola* consistently gave negative results, and the author concludes that *F. bulbigenum* is the causal agent of the rot. There was evidence of considerable variations of the relative resistance of different varieties of narcissus to the fungus.

In nature *F. bulbigenum* was found usually attacking the bulbs from the base upwards, but occasionally it was observed entering through the apex, especially in bulbs with two apices, in which case a very frequent point of attack was at the junction of the two components. So far no proof has been obtained that the

fungus enters the base of the bulb from infected soil through the dying roots, as Weiss stated to be the case in America [ibid., viii, p. 383].

In infected stored bulbs high temperature and high humidity were found to aggravate the disease, but neither appeared to affect adversely the condition of healthy bulbs in storage. No support was found for the claim that early planting of the bulbs has a controlling effect on the development of the rot in the field. Experiments with formalin, mercuric chloride, uspulun, and ceresan indicated that surface sterilization of the bulbs may be effective in reducing the amount of rotting during storage. Hot water treatment of the bulbs against eelworms appeared to favour the spread of the disease, this agreeing with Weiss's experience.

Twenty-fourth Report of the Vermont State Horticultural Society.—*Sixteenth Bienn. Rept. Vermont Commissioner of Agric. 1930–1932*, 116 pp., 6 pl., 1932.

The following items of phytopathological interest occur in this report. B. F. Lutman states that the apple varieties most susceptible to scab [*Venturia inaequalis*] in Vermont are McIntosh, Delicious, Fall Pippin, and Stayman; Grimes Golden is very resistant and a number of others are intermediate in their reaction to the fungus. Infection will occur in 13 to 18 hours at 43° F., in 9 to 11 at 48°, in 8½ at 59°, and in 4 to 6 at 68° to 75°. Commercial control in Vermont may usually be obtained by two applications of a fungicide between the delayed dormant and the calyx sprays. Recent experiments have shown that fair control results from dusting within 12 hours after an infection period and spraying within 40 to 48 hours.

M. B. Cummings explains the procedure of trapping the ascospores of *V. inaequalis* on glycerined slides. Under Vermont conditions discharge usually takes place in the early part of May, the critical period extending roughly from 20th April to 15th May. Spraying should be started as soon as the discharge begins in order to prevent infection.

Notes are given by R. E. Vaughan and M. B. Cummings on the occurrence and control of fireblight [*Bacillus amylovorus*] on apples in Vermont.

Rosen (H. R.). **Control of the blossom blight stage of fire blight.**—*Science*, N.S., lxxvi, 1976, pp. 447–448, 1932.

Further observations and experiments have been conducted in Arkansas with a view to the control of the blossom blight stage of fireblight [*Bacillus amylovorus*] in Jonathan apples [*R.A.M.*, xi, p. 160].

Four rows of heavily blighted trees (64) received the regular early season spray treatments, while seven rows (103 trees) were specially treated against blossom blight with five applications of a weak Bordeaux mixture (1–3–50), plus lead arsenate in the calyx and cover sprays, on four dates in April and one in May.

On the control trees receiving the ordinary treatment blight was observed on 25th April in 22 clusters, whereas none was detected in the Bordeaux-treated rows. Almost every control tree

showed a certain amount of blight by 5th May, though less than in the past few years, while those treated with Bordeaux were still quite healthy. On 9th May three out of the 103 Bordeaux-sprayed trees showed a total of five blighted blossom clusters. Secondary blight appeared to a limited extent on 18th May on about one-third of the controls and two of the Bordeaux-treated trees, the latter showing only four blighted leaf shoots in all.

Under experimental conditions, at any rate, blossom blight is evidently controllable by the treatment outlined above, but further observations are necessary to determine the general applicability of the schedule.

Dunegan (J. C.). **The occurrence of the perfect stage of Phomopsis mali in the United States.**—*Phytopath.*, xxii, 11, pp. 922–924, 1932.

A species of *Phomopsis* was repeatedly obtained from apple leaf spots near Fayetteville, Arkansas in 1931, and a comparison of the cultures with type material revealed their identity with *P. mali* [*R.A.M.*, ix, p. 658]. Perithecia, asci, and ascospores of a species of *Diaporthe* developed in 10 out of 34 isolations, and from these the pycnidial stage again arose and subsequently produced fresh perithecia. The globose perithecia are black externally, with an inner layer of brown tissue, and are furnished with curved, hairy, black beaks, 1 to 4 mm. long. The asci measure 40 to 60 by 5 to 7 μ and contain eight bicellular, hyaline, biguttulate spores, 9·5 to 13·5 by 2·7 to 3·8 μ, obtuse at both ends, slightly constricted at the septum. The species is provisionally referred to *D. perniciosa* [cf. ibid., iv, p. 174; xi, p. 767] pending a critical study of European cultures and exsiccata.

Baker (K. F.) & Heald (F. D.). **Some problems concerning blue mold in relation to cleaning and packing of Apples.**—*Phytopath.*, xxii, 11, pp. 879-898, 1 fig., 1932.

The washing tank is one of the chief sources of contamination of apples by blue mould (*Penicillium expansum*) in Washington [*R.A.M.*, xi, p. 658]. An investigation was carried out to determine the degree of toxicity of three of the most commonly used washing solutions to the spores of the fungus. The preparations tested were 3 per cent. hydrochloric acid, sodium carbonate-borax (brogdite) [ibid., xi, pp. 54, 570], ½ to 1½ lb. per gall. water, and sodium carbonate-trisodium phosphate (laux, supplied by the Laux Laboratories, Seattle), at the rate of 60 lb. per 100 galls.

Old spores were found to be consistently more resistant to toxic agents than young ones. The temperature as well as the toxicity of the solutions was shown to be an important factor in the control of the mould. Hydrochloric acid killed all the spores in 72 hours at 90°, in 12 at 100°, and in 4 to 5 at 110° F. Brogdite destroyed all the spores in 24 hours at 90°, in 12 at 100°, and in 6 to 7 at 110°, while laux was completely toxic in 72 to 84 hours at 90°, in 48 to 60 at 100°, and killed 86 per cent. in 11 hours at 110°. The toxicity of brogdite was found to be due to the sodium carbonate constituent. The spores of the mould failed to germinate at room temperature or 90° in sterile distilled or tap water. Germination

occurred in sterile apple juice and Brown's synthetic medium at 32° in 7 days and in 12 hours in 2 per cent. apple juice at room temperature but not in 14 at 90°, while spores held at 21° to 25° in 10 per cent. apple juice for 101 hours germinated readily on being returned to room temperature. A sodium hypochlorite solution containing 3·4 per cent. available chlorine was found to be completely toxic in 15 minutes at a strength of 3 oz. per gall. and in 3 hours at 0·1 oz. per gall. This high toxicity renders sodium hypochlorite very suitable for use in the packing-house as a disinfectant of the walls, packing boxes, and the like.

WORMALD (H.). **Bacterial diseases of stone-fruit trees in Britain. IV. The organism causing bacterial canker of Plum trees.**—*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 157–169, 2 pl., 1932.

In this paper the author gives details of the experiments in which he established the pathogenicity to stone fruit trees of *Pseudomonas mors-prunorum* [*R.A.M.*, xi, p. 726], the cause of bacterial canker of plum trees in England, as well as a detailed description of the morphology and cultural characters of the organism [cf. ibid., xi, p. 379]. It differs from *P. prunicola* in its white cloudy growth in nutrient broth with 5 per cent. saccharose; rapid production of acid on nutrient agar with 5 per cent. saccharose, in which it usually dies in four to six days; reaction at first alkaline and then acid on agar with 2 per cent. lactose; and very faint or no yellow colour in Uschinsky's solution. Its index number in the Descriptive Chart of the Society of American Bacteriologists is 5021 — 31100 — 0222.

SCHILBERSZKY (K.). **Über die Ursachen der Apoplexie bei den Steinobstbäumen.** [On the causes of apoplexy in stone fruit trees.]—*Angew. Bot.*, xiv, 6, pp. 536–551, 1932.

The writer discusses, on the basis of protracted observations in Hungary, the factors contributing to the condition known as 'apoplexy' or gummosis of apricot, cherry, and other stone fruit trees [*R.A.M.*, xi, p. 791]. Among such factors are the obstruction of the water-conducting elements by tyloses and the gummification of the tracheae associated with abnormal enzymatic activity; the physiological effects of severe frosts, especially those occurring in the late winter and spring, when the flow of sap is resumed; and unfavourable soil constitution (excessive moisture or drought) [ibid., xii, p. 181] and unduly deep planting, which adversely influence the vital processes of the trees.

POOLE (R. F.). **Late infection of Peach leaf curl in the Carolinas.**—*Plant Disease Reporter*, xvi, 16, pp. 171–172, 1932. [Mimeographed.]

Peach leaf curl (*Exoascus* [*Taphrina*] *deformans*) has hitherto caused no damage of economic importance in the sandhill regions of North Carolina, but in 1932, when the largest fruits were half to three-quarters of an inch in diameter, small hypertrophied areas of infection by this fungus were observed, confined to the fruit, usually on one side and near the calyx end. The diseased

tissues enlarged throughout the summer, reaching half an inch in diameter. No infection was observed on the early varieties, Belle (Georgia), Hiley (Early Belle), Red Bird, and Carman, even when growing in proximity to infected Elberta and Hale [*R.A.M.*, ix, p. 535]. The highest incidence of infection on individual trees was 15 per cent. It is not clear where the inoculum originated nor why the foliage escaped infection. In 1930 several abandoned orchards in both North and South Carolina were almost completely defoliated by *T. deformans*, while the fruit showed less than 10 per cent. infection. The diseased peaches were reddish to purplish and made no further growth on the diseased side, resulting in a decided malformation. Similar symptoms were reported from Georgia in 1928.

Roberts (J. W.) & Dunegan (J. C.). **Peach brown rot.**—*U.S. Dept. of Agric. Tech. Bull.* 328, 59 pp., 10 pl., 1932.

The history of brown rot of peaches in the United States shows that the disease was reported at least a century ago, and its fungous origin was clearly understood by a number of early investigators. The taxonomic position of the causal organism is discussed at length, the writers reaffirming their previous contention that the name *Sclerotinia fructicola* should be used to describe it in preference to *S. americana* [*R.A.M.*, vi, p. 625].

S. fructicola occurs in the United States, Canada, Australia, and New Zealand. In the United States the disease is responsible for heavy losses, especially in the more humid districts, amounting to as much as $5,000,000 in seasons favourable to the development of the fungus. Generally speaking, the present-day peach varieties show a certain amount of resistance to brown rot, a quality that has been gained, however, at the expense of flavour.

The morphology and physiology of the fungus are described in detail in the light of the writers' own investigations and those of other workers. The optimum temperature for the growth of *S. fructicola* was found to lie between 75° and 80° F., temperatures above 90° considerably retarding growth. Conidial germination takes place at 32°, but little development is made at low temperatures. Conidia produced naturally in the orchard are capable of withstanding winter temperatures, and a few ascospores were found to be viable five weeks after their discharge. The fungus is disseminated by wind, rain, birds, insects, and man, wind being the most important.

The period of apothecial production from mummied fruits and the blossoming of peach trees have been found to coincide very closely for a number of years. Invasion of the fruit may occur through the uninjured epidermis, but as a rule the fungus enters through the punctures made by the plum curculio (*Conotrachelus nenuphar*) or the oriental fruit moth (*Grapholitha molesta*). Twig canker formation may result from the infection of either blossoms or fruits.

The fungus is intercellular in the tissues of the flowers and fruits. In the petals and sepals the mycelium spreads rapidly through the cells. The conidia germinate on the surface of the stigma and the germ-tubes grow down intercellularly among

the cells of the style. All the parenchymatous tissues of the ovary may be invaded; the mycelium was also observed in the spaces between the pollen grains in mature anthers. The middle lamella of the fruit cells is dissolved by the fungus. The first symptom of canker formation in the twig tissues is the presence of a discontinuous, narrow, brown zone in the cambial region, where the cell walls have collapsed; later a circle of gum pockets supersedes the brown zone, and the cortical parenchyma is destroyed.

The control of brown rot depends largely on the timely and thorough application of fungicides, combined with measures for the extermination of the plum curculio and proper orchard sanitation. *S. fructicola* being particularly susceptible to the vapours given off by ethyl alcohol, a number of substances were tested in the hope of finding one the fumes of which would kill the fungus on peaches either in closed compartments at packing houses or in refrigerator cars during transit. Growth was entirely prevented by glacial acetic acid, 95 per cent. alcohol, aniline, benzaldehyde, carbon tetrachloride, cassia oil, chloral hydrate, *Eucalyptus globulus* oil, eugenol, horsemint (*Monarda punctata*) oil, lemon oil, peppermint (*Mentha piperita*) oil, safrol, sassafras oil, thyme oil (light), toluene, tricresol, and wormseed oil. The odour and flavour of the fruit were, however, adversely affected by these substances.

CURZI (M.). **I tripidi come causa della 'malattia del pennacchio' del Pesco.** [Thrips as the cause of 'plume disease' of the Peach.]—*Bull. R. Staz. Pat. Veg.*, N.S., xii, 2, pp. 238–243, 2 figs., 1932.

The author has obtained evidence that the so-called 'plume' disease of Early Elberta peach trees in Italy [*R.A.M.*, xi, p. 462] is caused by a *Thrips*. The symptoms result from the traumatic and toxic effect of the punctures, and not from any infective principle conveyed by the insect. When the thrips disappear, the affected branches recover.

ATANASOFF (D.). Шарка по Сливитѣ. Една нова вирусна болесть. [Plum pox. A new virus disease.]—*Yearbook Univ. of Sofia, Fac. of Agric.*, Sofia, xi, pp. 49–70, 6 figs., 1932. [English summary.]

This is a detailed account of the preliminary investigation of a serious disease of the plum tree, which was first noticed about 1918 in a restricted area of south-west Bulgaria, whence it has gradually spread in all directions, until now it is very common in southern Bulgaria from the Jugo-Slavian frontier in the west to Philippopolis in the east; it is not known to occur, however, in the northern part of the kingdom. Economically it is important in that affected trees never yield fruit fit for table or preservation.

The disease, which presents some features in common with American 'buckskin' of cherries [*R.A.M.*, x, p. 528] (some cases of which were seen by the author near Sofia), is chiefly prevalent on the Kustendil local variety of *Prunus domestica*, the chief early symptom on which is the development on the leaves of very characteristic light or yellowish-green spots, blotches, streaks, or more or less completely closed rings, the last-named forms somewhat

resembling ring spots of tobacco. The diseased trees blossom and set fruit normally; no symptoms appear on the latter until it reaches normal size, when it begins to ripen from 10 to 15 or more days earlier than that of healthy trees, in which respect the disease resembles peach yellows. At this time, occasionally even earlier, the fruit develops one or more blue spots, frequently more or less ring-shaped with centres of normal colour. Gradually the spots become sunken, the surface of the plum taking on a pock-marked appearance. The tissues underlying the spots are usually necrotic, rust-coloured, dry, and shrunken, the lesion often extending down to the stone; sometimes, however, they may be quite normal, except for a red to purple colour. The necrotic tissues often contain pockets filled with gum. The diseased fruit usually drops off before maturity; it is very poor in sugar, and has an unpleasant taste. Except for the above-mentioned symptoms, affected trees are entirely normal in the initial stages of the disease; they degenerate very slowly, but gradually the smaller branches and annual shoots begin to die and the trees assume a sickly appearance.

Besides the Kustendil variety, the disease has also been recorded, with somewhat different symptoms (some of which are described), on the Dollan, Afeska, Bardaklia, and white greengage varieties, and also on the Brnyanka variety near Brno in Czecho-Slovakia. A careful review of the relevant literature leads the author to believe that the same disease has also been seen, but not investigated, in Kentucky [*R.A.M.*, viii, p. 111 and above, p. 205], Minnesota, Illinois, and Holland [ibid., x, p. 252] and that it may be identical with a disease described by Carne in Australia [ibid., v, p. 676] and by Dippenaar in South Africa [ibid., xi, p. 521].

The disease, which the author terms plum pox, was proved to be readily transmissible to healthy trees by grafting. The fact that outbreaks in new localities were almost invariably preceded by heavy infestation of the trees by the scale insect *Lecanium corni* may indicate that this insect is involved in the spread of the infection, and experiments are in hand to test this possibility. Cherry plum [*P. divaricata*], which is commonly used in Bulgaria as grafting stock, has so far proved to be entirely immune from the trouble.

The threatening nature of the disease calls for drastic control measures, such as the complete eradication and destruction by fire of all affected trees, which is the more to be recommended because such trees never recover and their economic value is practically nil.

Cooley (L. M.). **Mild streak of black Raspberries.**—*Phytopath.*, xxii, 11, pp. 905–910, 1932.

Mild streak is a disease of the black raspberry (*Rubus occidentalis*) believed to be caused by a virus [*R.A.M.*, x, p. 530] and apparently restricted to this host. The symptoms of the disturbance in Ohio include hooking, twisting, and recurving of the midribs of the leaflets at the tips of the new canes, accompanied by a slight downward curling of the other leaves, giving a slightly 'rosetted' appearance. The foliage is somewhat darker than the normal and the apical leaflets may show narrow steel-blue to grey streaks, which sometimes appear also on the stems of fruiting

laterals, on the petioles, and on flower or fruit pedicels. The fruit develops unevenly and is of a disagreeable flavour. Under local conditions these symptoms are most pronounced in July and August. The Cumberland variety is the most susceptible. Field evidence suggests that the streak principle is conveyed from plant to plant by an insect, but no definite results have yet been given by transmission tests. The disease recurs each season on plants once affected but does not develop into the severe type (eastern blue stem) [ibid., ii, p. 128 *et passim*].

STEVENS (N. E.). **Notable outbreaks of Cranberry fruit rots in Massachusetts.**—*Phytopath.*, xxii, 11, pp. 911–916, 2 graphs, 1932.

The results of a nine-year study of the relation between weather conditions and the keeping quality of cranberries in Massachusetts indicate that abnormally high temperatures during May and June, coupled with a heavy rainfall in July and August, favour the development of fruit rots [*R.A.M.*, xi, pp. 188, 662]. Such conditions prevailed at the time of the severe outbreaks of disease in 1914, 1922, and 1931, while an examination of the weather records shows that one or both of the adverse meteorological factors operated also in 1887, 1888, 1889, 1912, and 1915, in all of which years the keeping quality of the fruit was inferior. In 1901 and 1906 the fruit also kept badly, but no exact statistics regarding the weather of those seasons are available.

BIRMINGHAM (W. A.). **Two fungous diseases of the Loquat.**—*Agric. Gaz. New South Wales*, xliii, 11, pp. 863–867, 7 figs., 1932.

The author states that loquat material sent in for examination in 1931 by two nurserymen in New South Wales showed that in one case the leaves were attacked by a species of *Entomosporium* which caused numerous purplish-brown, more or less circular (generally localized) spots with light centres bearing acervuli of the fungus; in some cases the spots ran together, forming large necrotic areas, and resulting in malformation of the leaf. The stems were also badly cankered by the organism, but so far it has not been seen on the fruits. Reference is made to Putterill's record of a species of *Entomosporium* on this host in South Africa [*R.A.M.*, ii, p. 70], and also to the occurrence on the Northern Tablelands of New South Wales of *E. maculatum* [*Fabraea maculata*: ibid., x, p. 39] which, in some seasons, does considerable damage to pears, causing the disease commonly known as fleck, leaf blight, or scald. Although experiments on the control of the fungus on loquat were not made, it is believed from experience with the similar pear disease that it may be amenable to spraying with lime-sulphur just before blossoming, just after the fruit has set, and from time to time as the tree makes new leaf growth. All diseased material should be removed and burnt.

In the other case, the stems and leaves of young loquat trees were badly attacked by *Fusicladium* [*dendriticum* var.] *eriobotryae* [ibid., viii, p. 268]. On the leaves the fungus forms more or less circular to irregular, dark green, velvety, amphigenous spots,

occasionally spreading until most of the leaf is involved. The affected tissues become brittle and break away. On the shoots, small, greenish-black, velvety spots are formed, which ultimately spread and fuse, forming large elongated blotches. The disease on loquats was recorded in New South Wales in 1902 by Cobb. For its control the following spray programme is suggested: 6–4–40 Bordeaux mixture just prior to blossoming, 1 in 35 lime-sulphur immediately after petal drop, and periodically as required until the fruit is half grown, and 6–4–50 Bordeaux mixture after this, if weather conditions require. In the nursery, the disease might be controlled by periodical applications of 6–4–50 Bordeaux mixture, and by the removal and destruction of all infected material.

Sokolovskaya (Mme R. E.). Методы определения физических свойств инсектисидов и фунгисидов. [Methods of testing the physical properties of insecticides and fungicides.]—*Bull. Leningrad Inst. for Controlling Farm and Forest Pests*, 3, pp. 283–293, 6 figs., 1932.

In this paper the author briefly describes various methods and apparatus [almost exclusively German] for testing the physical properties of liquid and dust fungicides and insecticides, all of which appear to be well known.

Horsfall (J. G.). **Red oxide of copper as a dust fungicide for combating damping-off by seed treatment.**—*New York (Geneva) Agric. Exper. Stat. Bull.* 615, 26 pp., 2 figs., 2 diags., 1932.

Details are given of a series of experiments on the control of damping-off (*Pythium ultimum*) in tomatoes [*R.A.M.*, xii, p. 122], eggplants, peppers (*Capsicum annuum*), and cabbage by means of seed treatment with red (or cuprous) oxide of copper (cuprite) dust [ibid., x, p. 371]; copper carbonate dust and copper sulphate solution and dust were used for comparison.

The tomato seed (John Baer) was shaken in an Erlenmeyer flask with an excess of dust (afterwards removed with a 20-mesh screen) and sown in greenhouse trays naturally contaminated by the fungus. Red oxide was found to be more effective than copper carbonate dust both against the pre- and post-emergence phases of damping-off. It was slightly superior to the copper sulphate soak (one hour) but less satisfactory than the copper sulphate dust for the pre-emergence phase, while it was definitely inferior to the copper sulphate soak for the post-emergence phase.

In the relatively few tests on Black Beauty eggplants, Harris's Early Giant pepper, and Enkhuizen Glory cabbage, red oxide increased the stand and reduced the incidence of damping-off. It is, in fact, particularly well adapted for use on the smooth seeds of these plants owing to its marked adhesive properties, considerably exceeding those of copper sulphate dust. Tests on tomato seeds showed that the amount of copper adhering after treatment with red oxide is nearly seven times as great as that remaining from copper sulphate applications (0·27 as against 0·04 mgm. per seed).

It was found that red oxide may safely be diluted to the extent of 25 per cent. with talc without impairing its fungicidal efficacy. Black (or cupric) oxide of copper failed to control damping-off in tomato and eggplant. Preliminary tests with red oxide and lime (20–80) against *Botrytis* on lily and *Septoria lycopersici* on tomato gave promising results.

HOFFMANN (W.). **Erfahrungen über Schädlingsbekämpfung in einer grösseren Stadtgartenverwaltung.** [Experiences with pest control in the administration of a large municipal garden.] —*Ratschläge für Haus, Garten, Feld*, vii, 11, pp. 162–164, 1932.

During the last five or six years the writer, in his capacity of municipal head gardener at Elbing [East Prussia], has secured a marked improvement in the health of the plants in the public gardens by the systematic control of diseases and pests. Thus, the severity of finger-and-toe of cabbage [*Plasmodiophora brassicae*] was greatly reduced by the treatment of the seed-beds with uspulun and the immersion of the roots before transplanting in an uspulun-solbar emulsion (one teaspoonful of the former and five of the latter per l. of water mixed with clay) [*R.A.M.*, ix, p. 752], followed by heavy liming. Solbar with an admixture of uspulun (50 gm. per 10 l. of water) has also proved efficacious against tomato canker [*Didymella lycopersici*: ibid., xi, p. 810] and leaf mould [*Cladosporium fulvum*: ibid., x, p. 631; xi, p. 680], the latter likewise yielding to nosprasit 'O' [ibid., xii, p. 32]. The same treatment effectually controlled celery rust [*Septoria apii*: ibid., x, p. 771]. Nosprasit 'O' is stated to have been invaluable in the orchard against the diseases and pests of all kinds of fruit.

Common names for plant diseases.—*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 203–207, 1932.

In this reply to Cunningham's recent paper [*R.A.M.*, xi, p. 386] the Committee for Plant Pathology of the British Mycological Society point out that, in their view, the chief purpose of common names for plant diseases is to provide the practical growers, rather than the plant pathologists, with a designation for each disease, apart from the pathogen, which they can use among themselves and when applying for advice from the specialists. In their opinion, this aim is best attained by basing the name on the most conspicuous outward symptom caused by the disease, provided it is qualified by the name of the host, a principle to which they adhered as much as possible in the list of common names published by them. They welcome Cunningham's suggestion of co-operation with the leading plant pathologists in all parts of the Empire for the purpose of arriving, eventually, at a list of standard names acceptable to all.

BLANK (I. H.). **Modified hanging drop technique.**—*Science*, N.S., lxxvi, 1978, pp. 496–497, 1 diag., 1932.

An improved hanging drop technique, which has been found

very satisfactory for photomicrographic work, has been devised by the writer in connexion with his studies of leather moulds at Cincinnati [*R.A.M.*, xii, p. 94].

A suspension of spores is made in any suitable liquid culture medium, and a drop transferred with an inoculating loop to the centre of a 22 mm. cover-slip. The drop is covered with a 9 mm. cover-slip, and can easily be made large enough to give a uniform film without air bubbles; the large cover-slip, carrying the smaller one, is then inverted and placed over the hollow chamber of a micro-culture slide, the edges being sealed with petrolatum to prevent evaporation of the medium. Using a hollow chamber about 15 mm. in diameter and 3 mm. in depth, sufficient oxygen is available to support normal growth of the spores near the edge of the smaller cover-slip. Only the vegetative hyphae of such moulds as the *Penicillia* and *Aspergilli* remain in the film of medium, the fertile ones growing in the air at the edge of the small cover-slip.

With the aid of this technique it was possible to take a motion picture of mould growth during a five-day period.

Takahashi (W. N.) & Rawlins (T. E.). **Method for determining shape of colloidal particles: application in study of Tobacco mosaic virus.**—*Proc. Soc. Exper. Biol. and Med.*, xxx, 2, pp. 155–157, 1932.

From a consideration of the principles laid down by Freundlich (Colloid and Capillary Chemistry, 1922) it was expected that, if a sol containing rod-shaped particles were forced from a small glass tube of circular cross section into the same sol contained in a beaker, the orientation of the particles should be the same throughout the stream, all parts of which, therefore, should show double refraction (Ambronn and Frey, Das Polarisationsmikroskop, 1926). If the direction of the flow were reversed and the sol sucked from the beaker through the glass tube, the sol in the beaker should flow radially towards the mouth of the tube as a centre and the long axis of the particles should be oriented parallel to the directions of flow. All regions of the sol in the beaker flowing towards the mouth of the tube would be expected to show double refraction except those flowing parallel to the vibration directions of the crossed nicols. A dark cross should, therefore, be observed in the doubly refractive sol flowing towards the mouth of the tube.

An attempt was made to determine the shape of the tobacco mosaic virus particles by the use of this method. Suspensions of the virus were found to show double refraction throughout the stream when forced from a small tube, the same phenomenon with the addition of a dark cross being observed in the opposite direction. Juice from healthy plants presented no double refraction when travelling in either direction. The experiment was repeated a number of times with juice from different portions of tobacco plants and with tomato plants infected by the same virus, always with identical results in regard to double refraction. Evidently, therefore, the tobacco mosaic virus, or some substance regularly associated with it, is composed of rod-shaped particles.

CHALAUD (G.). **Mycorhizes et tubérisation chez Sewardiella tuberifera Kashyap.** [Mycorrhiza and tuberization in *Sewardiella tuberifera* Kashyap.]—*Ann. Bryol.* (Year-Book), v, pp. 1–16, 17 figs., 1932.

The endophyte of *Sewardiella tuberifera*, a tuber-bearing member of the Hepaticae from India [cf. *R.A.M.*, v, p. 48], is stated to belong to the type already known in the European species of *Fegatella* [see next abstract], *Pellia*, and *Fossombronia*. The irregularly swollen, non-septate mycelial hyphae, measuring 2 to 7 μ in diameter, penetrate the rhizoids of the gametophyte. Arbuscules are of rare occurrence and ill defined, but sporangioles and thick-walled vesicles are numerous; the latter organs contain when young a dense protoplasm with a great number of small nuclei, and were twice observed to contain well-developed, small, unicellular spores with one or two oil drops in each, while three others were occupied by fragments of non-septate hyphae possibly resulting from spore germination. The endophyte passes to the gametophytes formed each year in succession by the growing point; the bulb itself, however, is not invaded.

BERGAMASCHI (MARIA). **Contributo allo studio dei funghi endofiti di Epatiche.** [A contribution to the study of the endophytic fungi of Hepaticae.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV^a, iii, pp. 185–221, 11 figs., 1932.

The author gives an extensive survey of the literature on the endophytes of the Hepaticae and describes the localization and characters of the fungus found in the thalloids of *Fegatella conica* growing in the province of Pavia [cf. preceding abstract]. The hyphae are hyaline, non-septate, and coralloid, resembling those of a Phycomycete. They invade the rhizoids and pass into the underlying cells where they form vesicles. The invaded zone is usually coloured reddish-violet. From the invaded plants the author isolated a *Mucor* resembling *M. rhizophilus*, a *Fusarium*, and a *Cephalosporium*. The *Mucor* when inoculated into seedlings of *F. conica* obtained from clean seed and grown aseptically favoured their growth, the uninoculated controls remaining stunted and weak.

Lunularia cruciata was similarly found to be invaded by an endophyte which enters by the rhizoids but was not observed to form vesicles. Isolations yielded various fungi, none of which was obtained with sufficient frequency to suggest that it might be the endophyte. No species of *Mucor* was obtained from this host.

BROWN (A. M.). **Diploidisation of haploid by diploid mycelium of Puccinia helianthi Schw.**—*Nature*, cxxx, 3290, p. 777, 1 fig., 1932.

Craigie has shown [*R.A.M.*, vii, p. 477] that *Puccinia helianthi* is heterothallic. In the writer's tests at the Dominion Rust Research Laboratory, Winnipeg, sporidia of the rust were sparsely sown on the upper surface of the first two foliage leaves of sunflower seedlings. From these inoculations arose 49 haploid pustules. At the age of three weeks none of these pustules bore

aecidia. Twelve were then marked for use as controls, and just beside 16 others uredospores of *P. helianthi* were sown. A week later this process was repeated with 12 other pustules, and after a further week uredospores were sown next to the remaining nine. As a result of these inoculations, uredosori (diploid pustules) arose at or very near the margin of each of the 37 haploid pustules. Eight to twelve days after the uredospore inoculations were made, aecidia began to appear on the under side of all the 37 pustules, while none developed on any of the uninoculated controls. Presumably the diploidization of the haploid by the diploid mycelium is effected by successive nuclear divisions and migrations after contact is established.

WHITEHEAD (T.) & CURRIE (J. F.). **Virus diseases in relation to commercial seed Potato production. With a study of the aphid population at selected farms,** by W. M. DAVIES.—*Ann. of Appl. Biol.*, xix, 4, pp. 529–549, 1 map, 1932.

This is a detailed report of the results of the authors' work, started in 1927, for the purpose of testing the possibilities of North Wales for the commercial production of high-yielding potato seed tubers. Of the fifteen farms originally selected under this scheme, eight were successful up to date in maintaining their stocks free from any noticeable increase of virus diseases, three showed a slight increase, and four had to be discarded for various reasons. Replicated trials at the College Farm, Bangor, of mixed seed tubers from the eleven successful farms showed that this material was equal in yield to Scotch 'stock' seed, a finding which was further confirmed by trials in a number of Welsh counties against ordinary T.S. certified Scotch seed.

The evidence collected by Davies indicated that the lack of increase of virus diseases mentioned above was not due to the scarcity or absence of known insect vectors of the diseases, e.g., *Myzus persicae*, nor to a non-infective condition of the aphids present, since representative samples of the insects taken from potato crops in the farms transmitted leaf roll to healthy potato plants under glass; such samples, however, only transmitted the disease when they included *M. persicae*. The accumulated data further suggest that the maintenance of health in the potato stocks was influenced less by the relative abundance of aphids than by the relation between the date of their maximum infestation and the stage of maturity of the potato foliage, since the best success was obtained in those farms where the maximum infestation was delayed and the potato tops died earliest from natural causes or from blight [*Phytophthora infestans*]. The relative movements of the aphids within the potato crops may also play a part in the intensity of spread of the virus disease, and this question is being investigated.

BUTLER (O.) & MURRAY (H. L.). **Effect of nitrate of potash on the vigor and productivity of healthy and leaf-roll Green Mountain Potato plants and their progenies.**—*Journ. Amer. Soc. Agron.*, xxiv, 11, pp. 881–887, 1932.

A detailed account is given of the writers' experiments in New

Hampshire to determine the effect of nitrate of potash on the vigour and yielding capacity of healthy and leaf roll Green Mountain potatoes grown in pots at two different temperatures, 15° and 20° C.

In 1930 ten tubers were bisected longitudinally and the halves grown one at each temperature, a similar lot receiving nitrate of potash at the rate of 15 gm. per pot. At 20° the fertilizer produced no effect during the first 45 days after planting, but at 15° the growth of the treated plants was somewhat retarded, though their colour was a much deeper green than the controls. Leaf roll plants received similar treatment, and in this case there was a delay in growth in the fertilized series at both temperatures, more pronounced at the higher one. The following are the figures for the increase in mean haulm length 53 days after planting at 15°; healthy 94·5 per cent., healthy fertilized 75·1, leaf roll 88·8, and leaf roll fertilized 47·1, the corresponding percentages at 20° being 8·3, 22·2, 3·8, and − 0·11, respectively. In the healthy series the nitrate of potash increased the yield of the plants grown at 15° by 33·5 per cent. and of those at 20° by 18·7 per cent. Treated leaf roll plants at 15° showed an increase of 12·2 per cent., but at 20° there was a loss of 5·2 per cent.

In 1931 one potato of a size to give individual seed pieces, when bisected, of 20 to 25 gm. in weight was taken from the harvest of each pot and the halves grown at the same temperatures as before. The remaining tubers from each pot were planted whole in beds and grown at 15° to ascertain whether any disease transmission had occurred: this test showed that the seed from the healthy plants gave healthy plants in all cases, and that from leaf roll plants diseased plants only.

The bisected tubers from the four groups of plants in the 1930 test gave eight groups in 1931 which were distributed as follows: healthy and leaf roll plants with and without nitrate of potash grown at 15° in both years; the same at 20°; healthy and leaf roll plants with and without nitrate of potash grown at 15° in 1930 and 20° in 1931; and the same grown at 20° in 1930 and 15° in 1931. In the case of the healthy plants the mean length of the haulms 45 days from the date of planting was 1·1 per cent. less in the fertilized than in the unfertilized grown at 15° in both years; 14·2 per cent. less in the group grown at 15° in 1930 and 20° in 1931; 8·2 per cent. less at 20° in both years; and 18·5 per cent. less at 20° in 1930 and 15° in 1931, the corresponding decrease of growth due to fertilization in leaf roll plants being 24·6, 36·6, 29·7, and 24·4 per cent., respectively.

In 1930 the mean haulm length of the unfertilized leaf roll plants grown at 15° was 20·6 per cent. less than in the healthy; in the leaf roll fertilized plants, 25 per cent. less than in the healthy fertilized; while in the plants grown at 20° the differences were 11·5 and 48·9 per cent., respectively. In 1931 the mean haulm length of the unfertilized leaf roll plants at 15° was much affected by the previous history of the plants. In the group grown at 15° in both years it was 27·7 per cent., and in that changed from 20° in 1930 to 15° in 1931, 42·7 per cent. less than that of the healthy plants. Previous history exercised no material

effect, on the other hand, on the unfertilized group grown at 20°, the mean haulm length in the lot changed from 15° in 1930 to 20° in 1931 being 37·7 per cent., and in that kept at 20° in both years, 36 per cent. less than that of the healthy plants. In the case of leaf roll plants receiving nitrate of potash, the mean haulm length was not appreciably affected either by temperature or by the previous history of the plants. The mean haulm length in the fertilized series grown at 15° in both years was 44·9 per cent., in that changed from 20° in 1930 to 15° in 1931, 46·8 per cent., in the series grown at 15° in 1930 and 20° in 1931, 50·1 per cent., and in that kept at 20° in both years, 51 per cent. less than that of healthy plants.

The leaf roll plants grown at 15° in 1930 yielded 42·2 per cent. less than healthy ones at the same temperature, the corresponding figure for 1931 being 49·3 per cent. Leaf roll plants receiving potash and grown at 15° gave 22·1 per cent. less yield in 1930 than healthy, unfertilized plants and 68·3 per cent. less in 1931. Leaf roll plants grown at 20° in 1930 yielded 24·4 per cent. less than healthy ones at 15° and 60·1 per cent. less in 1931. Leaf roll plants receiving nitrate of potash in 1930 yielded 30·2 per cent. less than healthy, non-fertilized plants at 15° and 76·4 per cent. less in 1931.

These data are considered to be of interest in connexion with Wartenberg's theory that potato degeneration under German conditions may result from the excessive use of potash fertilizers [*R.A.M.*, x, p. 542].

KRÜGER (K.). **Beiträge zur Physiologie der Blattrollkrankheit der Kartoffel.** [Contributions to the physiology of the leaf roll disease of the Potato.]—*Arch. für Pflanzenbau*, A, ix, 3, pp. 496–524, 3 figs., 4 diags., 1932.

A comprehensive account is given of the writer's studies at Landsberg a. d. Warthe on the physiology of potato leaf roll, the investigations of Schweizer [*R.A.M.*, x, p. 332] and other workers on which are summarized and discussed in the opening section of the paper.

A comparative study was carried out on the connexion between the disappearance of starch and the water content in healthy and leaf roll potatoes. It was shown by comparative transpiration measurements on healthy and diseased plants of the Alma, Gisevius, and Deodara varieties that wilting, rolled leaves at first lose less water than healthy ones, but that sooner or later these values are reversed, the healthy foliage giving off less water than the diseased leaves [cf. ibid., xi, p. 395]. Comparative respiratory measurements indicated greater final intensity in healthy than in diseased leaves [cf. ibid., xi, p. 467], notwithstanding an initial increase of respiratory activity on the part of the latter. This phenomenon appears to be attributable rather to mechanical disturbances than to any lack of respiratory enzymes in the leaf roll plants. Observations of the opening and closing movements of stomata of healthy and diseased plants showed that, with a decreasing water content, the stomata close very much more slowly in leaf roll than in healthy leaves, while on the other hand the

stomata of healthy leaves open more rapidly than those of diseased ones with an increasing water content. The fluids of leaf roll foliage showed a higher degree of acidity than those of healthy ones.

Some indication was obtained of possible benefit to leaf roll plants by the application to the tubers of a saponin (0·3 per cent.) and pepsin (0·5 per cent.) solution, with the addition of 0·2 per cent. bile acid solution. The treatment should be applied to the tubers in the spring, or to the plants in the early stages of growth (before flowering in any case).

RATHSACK (K.) & HURWITZ (S.). **Über das Verhalten von Kartoffelknollen verschiedener Abbaustufen im Alkohol, eine Möglichkeit zur Bestimmung des Abbaugrades? Vorläufige Mitteilung.** [Is the behaviour in alcohol of Potato tubers in varying stages of degeneration a possible standard for the determination of the degree of degeneration? Preliminary note.]—*Fortschr. der Landw.*, vii, 22, pp. 553–558, 1932.

The results are fully tabulated and discussed of preliminary tests at the Berlin Agricultural College to ascertain the amount of water withdrawn from potato tubers after two hours' immersion or longer in an alcohol bath with a view to determining whether this served as an index of the stage of degeneration reached [cf. *R.A.M.*, xi, p. 743]. The varieties used were Parnassia, Erdgold, Preussen, Sickingen, Lembke's Industrie, and Edeltraut. It was found that the amount of water withdrawn from the tubers declined with an increasing tendency to degeneration in the second and third progeny, so that there is evidently a certain correlation between vitality and dehydration capacity. Contrary to expectation, the tubers losing the least water were found to have highest absolute water content, so that the reaction is evidently abnormal.

RANG. **Schorf und Stippigkeit bei Kartoffeln.** [Scab and internal rust spot of Potatoes.]—*Deutsche Landw. Presse*, lix, 48, p. 604, 1932.

Complete control of potato scab [*Actinomyces scabies*] was obtained on an Oldenburg farm in 1931 by fertilizing with calcium cyanamide at the rate of 45 kg. per plot, together with potash and phosphorus in the usual amounts. The control plots without calcium cyanamide showed very heavy damage.

Internal rust spot [*R.A.M.*, xi, p. 670] was prevalent during the last two years, especially on the Erdgold variety. Cultural defects appear to be largely responsible for this disturbance, e.g., cultivation on impermeable soils and the use of fresh or insufficiently rotted stable manure, the latter being a most important factor in the causation of the disease.

PHILIPP (W.). **Starkes Auftreten des Pulverschorfs der Kartoffel 1932.** [A severe outbreak of powdery scab of the Potato 1932.]—*Die kranke Pflanze*, ix, 11–12, pp. 111–112, 2 figs., 1932.

An unusually severe outbreak of powdery scab of potatoes (*Spongospora subterranea*) occurred in Saxony during 1932. The

fungus is particularly liable to develop in mountainous regions, where its growth is promoted by heavy precipitation and low temperatures. Contrary to the usual experience, it was found to tolerate an alkaline soil reaction (P_H 7·1) very well [*R.A.M.*, ix, p. 265]. A number of the most popular commercial varieties were affected, including Ackersegen, Erdgold, Preussen, Magdeburger Blaue, Rosafolia, Juliniere, Goldfink, and Konsum. The most important control measure is soil drainage supplemented by applications of lime to loosen the structure of the soil.

Bonde (R.). **Potato spraying and dusting experiments 1929 to 1931.**—*Maine Agric. Exper. Stat. Bull.* 362, pp. 177–232, 4 pl., 1932.

Further experiments have been conducted in Maine on the spraying and dusting of potatoes [*R.A.M.*, ix, p. 265], the average annual increase of yield from which for the period from 1916 to 1931 is estimated at 29·5 bushels per acre, or about 9 per cent. of the average crop.

In 1929, when late blight [*Phytophthora infestans*] was practically absent, the application of Bordeaux mixture appeared to decrease the yield, whereas in the two succeeding years, which were marked by severe attacks of the fungus, the increase was 75 bushels per acre. There was no appreciable difference in yield in 1930 between plots sprayed with low and high pressure (230 to 300 and 400 to 500 lb. per sq. in., respectively). The yield with the tractor-power machine was higher with 'instant Bordeaux' [ibid., xi, p. 587] than with the standard preparation. Good control of late blight and satisfactory yields were given in 1930 by reduced concentrations of Bordeaux ($2\frac{1}{2}$–$2\frac{1}{2}$–50 and $3\frac{1}{3}$–$3\frac{1}{3}$–50). Copper-lime dust was less effective than Bordeaux mixture containing the same amount of copper (25 lb.) in the control of *P. infestans*. In the eight years from 1922 to 1925 and from 1928 to 1931 dusted plots yielded an average of 8 bushels less per acre than those given Bordeaux mixture.

The increased yields secured by the use of 'instant' as compared with standard Bordeaux, and the facility of preparation of the former, would seem to outweigh the higher cost of materials in many cases. Burgundy mixture also possesses some advantages over Bordeaux, one being the absence of a spray residue on the leaves which facilitates roguing for mosaic. This merit is shared by oxo-Bordeaux [ibid., xi, p. 161].

In 1931 the omission of the late applications (end of August and September) resulted in a reduction of yield from late blight amounting to 86 bushels per acre, or four-fifths as much loss as arose from total neglect of spraying. Disease surveys were made during the latter part of August in 1930 and 1931 in Aroostook County, where 82·5 per cent. of the 670 fields inspected were heavily diseased or dead in the former year and 62 per cent. of 640 in the latter, whereas those in which late blight was properly controlled by five to nine applications remained green until about the middle of August and gave an increased yield of more than a barrel a day after 24th August. Judging by the yield in certain test plots, the losses in the commercial fields of Aroostook must

have amounted to several million bushels per annum, largely owing to the premature cessation of spraying. Promising results have already been obtained by a potato spray service, inaugurated in 1931, the functions of which include the issue of 'spray warnings' and the dissemination of information as to existing disease conditions in the State [cf. ibid., xi, pp. 96, 123; xii, p. 76].

CHONA (B. L.). **The occurrence in England of a Potato wilt disease due to Fusarium oxysporum Schlecht.**—*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 229–235, 1 pl., 1 graph, 1932.

Isolations from Kerr's Pink potato plants which, late in the season of 1928, presented symptoms of wilt (inrolled and soft leaves) at the South-Eastern Agricultural College, Wye, Kent, yielded a fungus which closely agreed in its morphology and cultural characters with a strain of *Fusarium oxysporum* [*R.A.M.*, x, p. 642] obtained from Holland, and which was identified by Wollenweber as *F. euoxysporum* Wr. (= *F. oxysporum* Schlecht.). The pathogenicity of the organism to growing potato plants of the same variety was proved by inoculation experiments [details of which are given], in which it produced symptoms similar to those observed in nature. It was also shown to be able to attack potato tubers in storage, but at ordinary temperatures its rotting activity was much less than that of *F. coeruleum* [ibid., vii, pp. 261, 466, 739 *et passim*]. This is believed to be the first record of the wilt disease of potatoes caused by *F. oxysporum* in Great Britain.

FOSTER (W. R.) & MACLEOD (H. S.). **A new stem-end rot of Potato.**—*Canadian Journ. of Res.*, vii, 5, pp. 520–523, 1 pl., 1 graph, 1932.

Inoculations with monospore cultures of the newly described potato parasite, *Phomopsis tuberivora* [*R.A.M.*, xi, p. 671], on wounded and unwounded tubers of Irish Cobbler, Green Mountain, Early Ohio, and Bliss Triumph potatoes in British Columbia led to the development of typical symptoms of the stem-end rot caused by this organism. The optimum temperature for the growth of the fungus was found to lie between 20° and 25° C., only slight development occurring at 3·34° to 4·45° (38° to 40° F.), the usual storage temperature for potatoes. The optimum hydrogen-ion concentration for the development of *P. tuberivora* is about P_H 6·5. So far the disease has only been recorded in British Columbia.

JENSEN (H. L.). **Contribution to our knowledge of the Actinomycetales. III. Further observations on the genus Micromonospora.**—*Proc. Linn. Soc. New South Wales*, lvii, 3–4, pp. 173–180, 1 fig., 1932.

Continuing his studies of the Actinomycetales isolated from Australian soils [*R.A.M.*, xi, p. 601], the author gives some details of his investigation of 67 strains of *Micromonospora*, the results of which showed that these organisms exhibit only few morphological and biological differences of any taxonomic value. Certain differences in character of growth on agar media and in physiological properties allowed him, however, to separate them into four species-groups, namely, *M. chalceae* n. comb. (believed to be

probably identical with '*Streptothrix' chalceae* Foulerton), *M. fusca* n. sp., *M. parva* n. sp., and *M. coerulea* n. sp., brief English diagnoses of which are given. *M. chalceae*, the type species of the genus, is characterized on dextrose-asparagin-agar by a heavy, compact, raised vegetative mycelium, of delicate non-septate hyphae, 0·3 to 0·8 μ thick, which do not spread much into the medium. The spores are borne singly on the distal ends of short lateral branches and are round to oval and 1·2 to 1·5 by 1 to 1·2 μ in diameter. They form a well-developed, moist and glistening, brownish- to greenish-black layer. In liquid media the organism forms small, firm, orange granules or flakes. It hydrolyses starch, liquefies gelatin, and digests milk, mostly after coagulating it. Its optimum temperature for growth is 30° to 35° C., and its thermal death point for the mycelium 70° for two to five minutes, while the spores resisted 80° for one to five minutes. The other three species differ chiefly in cultural characters.

Dixon-Stewart (Dorothy). **Species of Mortierella isolated from soil.**—*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 208–220, 8 figs., 1932.

In this paper the author describes and figures four species of *Mortierella* and a variety of *M. isabellina*, all of which were isolated by her, among other soil fungi, from sandy loam in Victoria [*R.A.M.*, viii, p. 129], and which she considers to be new to science. Latin diagnoses of the organisms are given.

Salmon (E. S.) & Ware (W. M.). **The chlorotic disease of the Hop. III.**—*Ann. of Appl. Biol.*, xix, 4, pp. 518–528, 1932.

After stating that in 1931 the chlorotic disease of the hop [*R.A.M.*, xi, p. 539] was recorded on the varieties Fuggle, Early Bird, and Tutsham in three new localities of Worcestershire, the authors describe at length the results of their experiments on the transmission of the disease by grafting in various combinations. The disease was successfully transmitted to the commercial varieties Tutsham, Cobbs, and Mathon, and to three new seedling varieties, namely, M. 45, P. 13, and GG. 45. With one doubtful exception, all the plants of the commercial varieties which were successfully infected also showed symptoms of mosaic [loc. cit.], presumably originating from the Fuggle scions. In three cases, individuals of symptomless mosaic carriers of two varieties, to which the chlorotic disease was transmitted, eventually developed marked symptoms of mosaic, but in an appendix it is pointed out that, since the paper was written, two cases have been observed of a natural appearance of mosaic in plants which hitherto had been symptomless carriers of the disease. Two further instances are recorded of the appearance in scions of chlorotic symptoms in the course of the year in which the scions were grafted to the infected stocks.

Frickhinger (H. W.). **Zur Bekämpfung der Hopfenperonospora.** [On the control of the Hop *Peronospora*.]—*Die kranke Pflanze*, ix, 11–12, pp. 117–118, 1932.

The writer was impressed, on a recent tour through the German hop-growing districts, by the urgent necessity of timely spraying

against *Peronospora* [*Pseudoperonospora humuli*: *R.A.M.*, x, p. 622]. From conversations with a number of experienced growers he elicited some information concerning the correct times of application and fungicidal concentrations. In open situations good results were secured by commencing the treatments towards the end of May or early in June, but an earlier beginning should be made in gardens protected from the wind by trees or mountain slopes. Frequent applications at a low concentration (1 to 1·5 per cent.) of Wacker's Bordeaux mixture (copper-lime) [ibid., x, p. 706] are of more value than two or three at a higher strength. It is a mistake to cease spraying after five or six applications, a further two to three being requisite for the complete protection of the plants.

HAMILTON (MARION A.). **On three new virus diseases of Hyoscyamus niger.**—*Ann. of Appl. Biol.*, xix, 4, pp. 550–567, 3 pl., 1932.

This is a detailed account of the author's study of three viruses, termed Hy. II, Hy. III, and Hy. IV, respectively, which she obtained in 1930 and 1931 from henbane (*Hyoscyamus niger*) plants (grown for pharmaceutical purposes in two separate fields in Bedfordshire) presenting symptoms of stunting and necrosis, sometimes accompanied by a deformation and rosette habit of the leaves.

Hy. II was obtained by needle inoculation of the juice of the original diseased plants from one of the fields in 1930 into healthy henbane seedlings. In subsequent inoculation work this virus was shown to produce a transient veinbanding in young henbane leaves, later passing into a dark green, irregular mottling in the older leaves. A similar veinbanding, but persisting throughout the life of the host, was also produced in tobacco. In young *Nicotiana glutinosa* plants Hy. II gave faint veinband symptoms which rapidly disappeared. It never produced symptoms either in tomato seedlings or in any of the potato varieties tested. The virus is transmissible by needle, and to a lesser extent through *Myzus persicae*, between *H. niger*, *N. glutinosa*, and tobacco. It passes an L 1 Chamberland but not an L 3 filter, and it became inactive after immersion for 10 minutes in water at 60° C. or over. No definite intracellular inclusions were observed in the tissues of the leaves, stems, and hairs of the plants inoculated with it.

Hy. III was obtained from the two tomato seedlings which alone were successfully inoculated with the juice from the original diseased plants in 1930, and it was never again recovered from the field. In these two seedlings, the inoculation produced symptoms of extreme stunting with dark coloration, blistering, and deformation of the leaves, the same symptoms appearing again in all tomato seedlings inoculated with it. In *H. niger* and tobacco it caused a violent yellow mosaic with a tendency to broad, dark green bands along the veins, necrosis of the older leaves, and some deaths among the weaker and younger plants, especially during the spring. It also caused disease symptoms [which are briefly described] in *N. glutinosa*, *N. glauca*, *Petunia* sp., and *Datura*

stramonium. None of the potato varieties tested was infected by it. This virus is much more infective than Hy. II, and is freely transmissible by the needle, and through *M. persicae* between *H. niger*, *N. glutinosa*, and tobacco; this insect was not able, however, to take it to or from tomato, to which the virus is only transferable by needle. The filterability and resistance to heating of Hy. III are the same as for Hy. II. In clarified diseased plant juice the virus apparently did not survive 24 hours keeping. It formed cell inclusions, similar to aucuba and tobacco mosaic X-bodies, in *H. niger*, tobacco and tomato.

Hy. IV was obtained in 1931 from diseased henbane plants in the second field, distant about a mile from the first. In *H. niger* seedlings it gave an all-over 'pepper-and-salt' mottle, which in some leaves had a tendency to form rings; the latter never became necrotic, but after passage through tomato, the virus gave definite ring necrosis in *H. niger*, and also necrotic symptoms in tobacco. In tomato it gave an all-over mottle similar to potato mosaic in this host, but rather more of a veinband type. In tobacco the symptoms appeared first on the leaf next in order of growth to the one inoculated, and proceeded in this order over the whole plant. The infectivity of clarified juice of Hy. IV from tomato and *H. niger* was apparently unaffected by keeping for 48 hours; it was reduced by heating at 70° C. and almost disappeared at 80°. So far the virus has not been found to cause intracellular inclusions, or to be transmissible by any of the insects tested.

SIBILIA (C.). **Un parassita del Finocchio.** [A parasite of Fennel.] —*Boll. R. Staz. Pat. Veg.*, N.S., xii, 2, pp. 210–235, 10 figs., 1932.

In 1927, fennel (*Foeniculum vulgare*) growing in the vicinity of Rome, especially in gardens where intensive cultivation is practised, became affected by a disease caused by a *Ramularia*. Slight infections were confined to a local yellowing of the leaf blades, petioles, and stems, but in severe attacks the whole plant wilted; on the petioles and stems brown, depressed, elliptical or rectangular spots appeared, covered after a few days by rows of minute blackish dots. The affected parts of the leaf blades became constricted, darkened, and showed numerous black dots.

The hyaline or slightly fuliginous conidiophores were 47 to 55 μ long, and bore at their extremity one or more hyaline, usually 1-septate, elongated or almost cylindrical conidia, with obtuse ends, either singly or in chains of two or three, arising from a short beak at the extremity of the conidiophore. At maturity the terminal conidia became detached, but others developed, conidium production continuing for a fortnight. The mycelium was usually intercellular and measured 2·35 to 4·75 μ in diameter.

In culture on various media the fungus gave only sclerotia and conidia, the measurements of the latter averaging 42·4 by 6·5 μ, as against 45·5 by 6·5 μ in nature.

The fungus is named *R. foeniculi* and a Latin diagnosis is given. It appears to be restricted to fennel. Control should consist in the destruction of diseased material and applications of 0·5 per cent.

Caffaro powder, or 0·1 per cent. uspulun or granosan [see above, p. 214].

Bell (A. F.). **Work of the Division of Pathology.**—*Thirty-second Ann. Rept. Queensland Bureau of Sugar Exper. Stat.*, pp. 46–50, 1932.

A disease of sugar-cane observed by the author in Queensland in 1929 and provisionally termed pseudo-streak has now been identified with the Hawaiian chlorotic streak [*R.A.M.*, xi, p. 4], a disease which also occurs in Java and Porto Rico. No causal organism has been found, and in Queensland the condition is practically confined to the Badila variety. It appears to be readily controllable by hot water treatment of the cuttings intended for planting.

When cuttings from 32 sugar-cane crosses were inoculated at planting with a suspension of *Bacterium albilineans* from three sources the results for a single year showed marked differences in susceptibility (e.g., N.G. 24 × E.K. 28 gave 98 per cent. infected stools as against 0 for N.G. 15 × S.C. 12/4 and P.O.J. 2364 × S.C. 12/4).

Red stripe [*Phytomonas rubrilineans*: ibid., xi, p. 473] on Badila canes is almost completely controllable by early (i.e., autumn) planting.

Dwarf disease [ibid., xi, p. 472] was recorded on one farm in a new locality, but the total number of affected farms fell to eight during the period under review. No causal agent was detected.

Ocfemia (G. O.). **An interesting reaction of a Sugar Cane variety to grass mosaic.**—*Philipp. Agric.*, xxi, 6, pp. 414–419, 2 figs., 1932.

On 2nd January 1932, a sugar-cane stalk (Linabnig variety) showing conspicuous symptoms of grass mosaic [*R.A.M.*, vi, p. 318] in its leaves, was sent to the writer from the Los Baños College of Agriculture. Cankered areas were present on the stalk and the internodes were abnormally short. On 8th January four lateral shoots free from mottling were cut off and the main stalk cut into five parts, the cuttings being tied together, immersed in tap water for 48 hours, and wrapped in a wet cheesecloth to germinate. Ten days later the cuttings were planted in sterilized garden soil.

The plants developing from the apparently healthy lateral shoots were free from mosaic symptoms and altogether more vigorous than those from the main stalk, which showed the typical mottling, but mechanical transmission experiments from the former, carried out by Sein's method [ibid., ix, p. 678] on young, healthy shoots of Mauritius 1900, gave a high percentage of infection, indicating that the virus was present in a latent form in the lateral shoots.

In a final inspection (11th October) of the experimental plot, only 5 out of a total of 29 stools grown from apparently healthy Linabnig stalks showed leaf mottling. The propagation of this tolerant variety may therefore assist in the reduction of mosaic injury in the Philippines.

Seaver (F. J.), Chardon (C. E.), & Toro (R. A.). **Supplement to mycology.** *ex* **Scientific survey of Porto Rico and the Virgin Islands.**—*New York Acad. Sci.*, viii, 2, pp. 209–225, 229–240, 1932.

Additions and annotations are made to the list of fungi of Porto Rico and the Virgin Islands published in December, 1926, and a bibliography of 220 titles is appended. The total number of fungi, including Myxomycetes, now known to occur in this area is about 1610. The following are some of the records of interest, in addition to those already noticed from other sources. *Phytophthora capsici* has been found in Porto Rico on *Capsicum frutescens* seedlings [*R.A.M.*, xi, p. 803]. *Pythium aphanidermatum* has been found on papaws, and *P. graminicolum* on sugar-cane [ibid., xi, p. 540]. *Gibberella moniliformis* has been found (with its imperfect form *Fusarium moniliforme*) causing a wilt of coffee seedlings in Porto Rico; *Pleocyta sacchari* (syn. *Melanconium sacchari*) on dead and dying sugar-cane; *Steirochaete capsici* (syn. *Vermicularia* [*Colletotrichum*] *capsici*) on chilli pepper [ibid., xi, p. 804]; *Sporotrichum mansoni* (syn. *Cladosporium mansoni*) causing a human skin disease, black ringworm [ibid., x, p. 105]; *Acrothecium capsici* on chilli pepper; and *F. batatatis vanillae* on vanilla.

Kern (F. D.). **Supplement to Uredinales.** *ex* **Scientific survey of Porto Rico and the Virgin Islands.**—*New York. Acad. Sci.*, viii, 2, pp. 226–227, 1932.

Eleven rusts are here added to the list already published in 1926, bringing the total number known in Porto Rico and the Virgin Islands to 189. *Uromyces arachidis* (Speg.) P. Henn. on groundnut should be referred to *Puccinia arachidis* Speg. [*R.A.M.*, x, p. 501].

Curzi (M.). **De fungis et morbis africanis. I. De quibusdam hyphomycetibus parasitis Somaliae.** [Of African fungi and diseases. I. Concerning certain parasitic Hyphomycetes from Italian Somaliland.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 2, pp. 149–168, 3 pl., 6 figs., 1932.

A new genus, *Cercodeuterospora* Curzi, is established for a parasite of pigeon pea (*Cajanus indicus*) from Somaliland. It is characterized by undifferentiated, hyaline, fertile hyphae, which emerge from the stomata and branch over the surface of the leaf, thickening irregularly in places and assuming a dark olivaceous or fuliginous tint. From these hyphae small lateral branches are produced, usually one from each cell. These become septate and are released from the mother-hyphae as conidia resembling those of *Cercospora* in shape but less regular in form and less differentiated from the ordinary hyphae. They often appear as simple, lateral mycelial branches which become detached, and the main hyphae also show a tendency to fragment into spore-like segments.

The new species, which is named *C. trichophila* Curzi, produces angular, often confluent spots on the leaves, limited by the veins, 1 to 2 mm. broad, light tawny on the upper surface, drab on the lower and giving the leaf a mosaic appearance. The mycelium in the leaf is hyaline, septate, and 2 to 2·3 μ in diameter, while after

emergence on the under surface it becomes olivaceous or faintly fuliginous, and is 2 to 8 μ in diameter. The elongated-obclavate, straight or curved, single, sparse, faintly olivaceous, frequently 2- to 4-septate conidia measure 20 to 50 by 3 to 4 μ, and arise only on one side of the hyphae.

Cercospora itulica Curzi n. sp. on the leaves of the kapok tree *Ceiba pentandra* [*Eriodendrodron anfractuosum*] produces indeterminate, tobacco-coloured spots 1 to 5 mm. in diameter. The pale olivaceous, pluriseptate conidiophores arise on the under surface singly or in clusters from prominent stromata, are alternately branched, occasionally thickened locally, and measure 30 to 40 by 3 to 4 μ. The subcylindrical, olivaceous, straight or curved conidia are 3- to 6-septate, not or very slightly constricted, tapering at both ends, and measure 35 to 55 by 2·5 to 3·75 μ. So far as the author is aware this is the only *Cercospora* recorded on *E. anfractuosum*.

C. somalensis Curzi n. sp. on the leaves of *Cassia fistula* produces sparse, irregular, amphigenous, dark chestnut spots with a blackish-purple margin surrounded by a pale zone. On the lower surface of the leaf dense tufts, 20 to 50 μ in diameter, arise from a noduliform basal stroma. The simple, erect, continuous, olivaceous conidiophores are sometimes septate, frequently tapering and pale at the apex, and measure 8 to 15 by 2·75 to 3·5 μ. The conidia, at first hyaline, continuous, and ellipsoidal, are later elongated, subcylindrical, 2- to 6-septate, olivaceous, tapering at both ends, and measure 20 to 42 by 2·5 to 3 μ.

C. sesami Zimm. var. *somalensis* Curzi n. v. on the leaves of *Sesamum indicum* produces sparse spots 0·5 to 5 mm. in diameter. At first they are minute, sub-rotund, with a whitish centre surrounded by a blackish-purple margin, later they become larger, angular, and distinctly zonate with alternately whitish and blackish-purple circles. The amphigenous, chestnut, dimorphous conidiophores arise from prominent stromata in small bundles or singly; on the upper surface of the leaf they usually arise in tufts and are conspicuously thickened at the base and tapering or geniculated at the apex; non-septate or sparsely septate, and measuring 27 to 40 by 3 to 7 μ. On the under surface they arise singly or in bundles of two or four, and are straight, septate, and frequently 3 to 4 μ in diameter. The straight or flexuous, cylindrical, hyaline conidia are 5- to 6-septate and measure 40 to 70 by 3 to 3·5 μ.

C. [*Cercosporina*] *ricinella* was present on the leaves of *Ricinus communis*. On tobacco leaves *Cercospora nicotianae* produced sparse spots 3 to 8 mm. (sometimes reaching 1 cm.) in diameter. Some of the conidia were bifurcated at the tip, while others had a short lateral stalk protruding 4 to 6 μ from near the basal scar.

Tai (F. L.). **Notes on Chinese fungi. I.**—*Nanking Journ.*, ii, 171–179, 23 figs., 1932.

An annotated list is given of 18 Chinese fungi [cf. *R.A.M.*, xi, p. 674] of which the following may be mentioned. *Shiraia bambusicola* forms a tuber-like, hemispherical stroma on the leaf sheath of bamboo (*Phyllostachys* sp.), pinkish-buff on the outside and

spinel-red inside (Ridgway's Color Standards), 1·5 to 2·5 cm. long by 1 to 1·5 cm. high.

Puccinia pruni-persicae, the uredospores of which were found to differ considerably from Hori's description (*Phytopath.*, ii, p. 144, 1912) in being pale brown, echinulate, subglobose to obovate, 19 to 28·5 by 14·4 to 19 μ in diameter and with numerous hyaline, capitate paraphyses, has been observed on peaches. *P. fagopyri* Barclay occurs on *Fagopyrum esculentum*.

Sorghum is attacked by *Titaeospora andropogonis* (Miura): syn. *Ramulispora andropogonis* Miura (*S. Manchuria Agric. Bull.*, xi, p. 43, 1920), which is an important parasite of the crop in China. It forms oblong or irregular, red-bordered spots on the leaves. In July the centres of the lesions become greyish and powdery from the development of the conidial stage of the fungus, and in September small, black, hemispherical bodies develop. The conidiophores of the fungus are fasciculate, subnodose, non-septate, with or without branches, hyaline, 20·4 to 32·3 by 2·04 to 2·89 μ, and the conidia filiform, with 2 or 3 branches up to 50 μ long, hyaline, curved, 47·6 to 106·9 by 2·04 to 3·06 μ in diameter, and 5- to 11-septate (mostly the former).

Mendoza (J. M.). **The Philippine species of Parasterina.**—*Philipp. Journ. of Sci.*, xlix, 3, pp. 443–459, 14 pl., 1932.

The writer lists 16 species of Philippine *Parasterina*, several of which are transferred from *Asterina* to *Parasterina* as they were found to be paraphysate. Two new species are described. English diagnoses are given of all the fungi mentioned, a key and a host index to the species also being furnished.

Park (M.). **Tuber zeylanicum B. & Br. and Sclerotium rolfsii Sacc.**—*Trans. Brit. Mycol. Soc.*, xvii, 3, pp. 179–181, 1 pl., 1932.

In referring to Petch's recent note on *Tuber zeylanicum* [*R.A.M.*, x, p. 751], the author states that re-examination of the types and other material in Kew and in Ceylon showed that this organism and *Sclerocystis coremioides* are separate fungi and distinct from *Sclerotium rolfsii*, and that *S. zeylanicum* is identical with *S. rolfsii*, the latter name having priority.

De Jong (J. K.). **Roode wortelschimmel.** [Red root fungus.]—*De Bergcultures*, vi, 45, p. 1213, 1932.

Attempts to check the extension of the red root fungus [*Ganoderma pseudoferreum*] in Java tea plantations [*R.A.M.*, xi, p. 131] by means of circular trenches 1 m. deep round the centres of infection have not proved uniformly successful, possibly because the spread of the organism is apt to be very diffuse and the extent of its radius of infection correspondingly ill defined. It is also possible that infection may be partially disseminated by spores. Dr. Steinmann recommends the adoption of the trench method only in cases where the infection foci are well marked and the path of the fungus readily traceable.

Tea-cider—a new drink in Java.—*Planters' Chron.*, xxvii, 24, p. 609, 1932.

Instructions are given for the preparation of the so-called 'tea-cider' by the inoculation of an ordinary tea infusion plus 10 per cent. sugar with the 'mould' [*Bacterium xylinum* and *Saccharomycodes ludwigii*: *R.A.M.*, xi, p. 676]. This beverage is stated to have gained a wide popularity in Java as a result of the recent propaganda.

Stevens (N. E.). **United States of America: Tobacco downy mildew in 1932.**—*Internat. Bull. of Plant Protect.*, vi, 11, pp. 180–181, 1932.

Downy mildew of tobacco (*Peronospora hyoscyami*) was more widespread and destructive in the United States in 1932 than the preceding year [*R.A.M.*, xi, pp. 9, 806]. In Georgia and North Carolina the shortage of seedlings caused by the disease was so serious as materially to retard planting, while up to 20 per cent. infection was counted on a farm in Lancaster County, Pennsylvania. The fungus made its first appearance at the end of January on two beds of volunteer plants in southern Georgia. During the first week of April it was generally distributed in the tobacco-growing regions of Georgia, Florida, South Carolina, and the coastal districts of North Carolina. Other States affected were Virginia, Maryland, and Pennsylvania. In Florence County, South Carolina, the disease assumed epidemic proportions, destroying up to two-thirds of the plants in a single bed and creating a panic among the growers, while east of Raleigh, North Carolina, about one-third of the seed-beds were badly affected and some severely damaged.

Guba (E. F.). **Tomato diseases in Massachusetts in 1932.**—*Plant Disease Reporter*, xvi, 16, pp. 175–176, 1932. [Mimeographed.]

The tomato crop on fully 90 per cent. of the farms in Massachusetts is stated to have been destroyed by fungous diseases in 1932. In addition to severe infection by early blight (*Alternaria solani*) [*R.A.M.*, xi, p. 355], leaf mould (*Cladosporium fulvum*) [ibid., xi, pp. 409, 561] (to which the Norton variety proved resistant), bacterial canker (*Aplanobacter michiganense*) [ibid., xii, p. 81], and wilt (*Verticillium ovatum*) [ibid., xi, p. 245], the epidemic of downy mildew (*Phytophthora infestans*) on late tomatoes [ibid., xi, p. 78] was more destructive than in any year since 1905. In October the disease was causing immense losses also in the greenhouse crops. The virulence of the fungus is attributed to the protracted heavy rains of August and early September, with warm days and cool nights, conditions that were paralleled at the time of the previous epidemic. The season of 1932 was not conspicuous for outbreaks of potato blight, which appear rather to occur in years of slight tomato downy mildew, thereby confirming the hypothesis of a biological difference between the two strains of *P. infestans* [ibid., vi, p. 583].

Berkeley (G. H.) & Madden (G. O.). **Transmission of streak and mosaic diseases on Tomato through seed.**—*Scient. Agric.*, xiii, 3, pp. 194–197, 1 pl., 1932. [French summary on p. 199.]

After a passing reference to a previous communication by the senior author (Streak diseases of the Tomato.—*25th Ann. Rept. Vegetable Growers' Assoc.*, Ontario, 1929) describing a test which demonstrated the transmissibility of tomato streak [*R.A.M.*, vi, p. 325; ix, p. 433] through seed, the authors give details of further field and greenhouse work which confirmed this finding, extending it also to tomato mosaic. Both diseases were also shown to be transmissible to healthy plants by inoculation with the juice from crushed embryos dissected out of seed produced by diseased plants. It is pointed out, however, that cases of transmission both directly through the seed and by inoculation from diseased seed are relatively rare and uncertain. Using embryos from streak for the inoculation of healthy plants, negative results were obtained three times, and positive twice, while using seed from mosaic plants, although many negative results were also obtained, as much as 66·6 per cent. successful inoculations resulted in some cases. It was shown that the streak and mosaic which resulted from these inoculations are capable of further transmission and are apparently similar to the diseases as they appear in nature.

In view of these results, it is recommended that seed should be selected from plants free from streak and mosaic. The efficacy of this precaution, in conjunction with measures calculated to prevent infection of the plants from outside sources, was well demonstrated by the fact that the authors grew five successive crops of tomatoes without a single case of streak or mosaic, while previously to this their experimental crops always showed considerable mosaic and some streak.

Sengbusch (R. v.) & Loschakowa-Hasenbusch (N.). **Immunitätszüchtung bei Tomaten. Vorläufige Mitteilung über die Züchtung gegen die Braunfleckenkrankheit (Cladosporium fulvum Cooke) resistenter Sorten.** [Breeding for immunity in Tomatoes. Preliminary note on the breeding of varieties resistant to leaf mould (*Cladosporium fulvum* Cooke).]—*Der Züchter*, iv, 11, pp. 257–264, 5 figs., 1932.

An account is given of experiments conducted at the Kaiser Wilhelm Institute for Breeding Research, Müncheberg, Mark Brandenburg, in the development of tomatoes resistant to leaf mould (*Cladosporium fulvum*) [see above, p. 249].

Solanum racemigerum, a wild relative of the cultivated tomato with very small fruits, was found to be immune from leaf mould and was accordingly crossed with a number of susceptible commercial varieties. All the F_1 progeny of crosses between the wild and cultivated forms were immune (the tests of this generation included Bonny Best, Danish Export, and Tuckswood as the susceptible parent). Only 46 F_2 plants (Westlandia × *S. racemigerum*) were available for testing, of which 11 (23·9 per cent.) were susceptible and 35 (76·1 per cent.) immune. The F_3 material comprised 6,968 plants from crosses between *S. racemigerum* and

Lucullus, Danish Export, Allerfrüheste Freiland [Earliest of All Outdoor], Golden Queen, Tuckswood, and Condine Red, tests on which indicated that 41·36 per cent. were susceptible and 58·64 per cent. immune, the anticipated figures for each group on a simple Mendelian ratio being 37·5 and 62·5 per cent., respectively.

It is considered very probable from these data that the inheritance of immunity from *C. fulvum* was determined by a single dominant factor, so that tomato plants combining this character with desirable commercial qualities (such as large fruits) should be obtainable by crossing on the lines indicated above.

In crosses between the resistant (but not immune) Stirling Castle and susceptible varieties, all the F_1 progeny were highly susceptible. Evidently, therefore, the resistance of Stirling Castle, as opposed to the immunity of *S. racemigerum*, is conditioned by recessive factors.

Vanine (S. I.) & Kotchkina (Mme E. M.). Методика фитопатологического исследования семян древесных пород. [Methods of pathological investigation of the seeds of arboreal species.]—*Bull. Leningrad Inst. for Controlling Farm and Forest Pests*, 2, pp. 285–297, 3 figs., 1932. [English summary.]

After stressing the importance from the phytopathological standpoint of determining the micro-organic flora present on the seeds of arboreal species, with particular reference to forest trees, the authors describe two methods for this purpose, one which is the usual method of planting out the seed on agar in Petri dishes, and the other consists in washing a given number of the seeds in a determined volume of sterilized water, and plating out a determined volume of the rinsings on agar. The latter method is most suitable for large-sized seeds, such as acorns, chestnuts, and the like, and allows of calculating the total number of fungal spores present in a sample from the number of colonies produced on the agar plates.

Rankin (W. H.). **Spraying for leaf diseases of shade trees.**—*Proc. Eighth Ann. Meeting Nat. Shade Tree Conf., 1932*, pp. 64–69, 1932.

Attention is drawn to the need for a systematic spraying programme against the leaf and twig diseases of shade trees in the United States, including black leaf spot of elms [*Gnomonia ulmea*: *R.A.M.*, x, p. 632], leaf and twig blight [*G. veneta*] of plane [*Platanus*: ibid., vii, p. 285], horse-chestnut [*Aesculus hippocastanum*] and buckeye [*A. flava* and *A. californica*] leaf blotch [*Guignardia aesculi*: ibid., vi, p. 581], brown leaf spot [? *Gnomonia leptostyla*] of black walnut [*Juglans nigra*] and butternut [*J. cinerea*: ibid., ix, p. 275], leaf and twig blight of willows [*Fusicladium saliciperdum*: ibid., xi, p. 214], and leaf and twig blight [? *Phomopsis juniperovora*] of young juniper and arbor-vitae [*Thuja occidentalis*: ibid., xi, p. 96]. Three applications of Bordeaux mixture should be given well ahead of the critical periods for infection, (a) when the leaves are unfolding, (b) when they are full-sized, and (c) about a fortnight after the second.

Liming (O. N.). **The Dutch Elm disease in America.**—*Proc. Eighth Ann. Meeting Nat. Shade Tree Conf., 1932*, pp. 111–113, 1932.

No further cases of the Dutch elm disease [*Ceratostomella ulmi*] were detected in the United States up to August 1932 [*R.A.M.*, x, p. 632]. Of the eight cases hitherto reported (four each in 1930 and 1931) seven are at Cleveland and one at Cincinnati (Ohio). The trees in question were severely infected, and attention is drawn to the urgent necessity for prompt removal of diseased individuals and immediate notification of suspected cases in order to check further spread.

Atanasoff (D.) & Martinoff (S.). Загиването на Брѣста. **Ceratostomella ulmi (Schwarz) Buisman—Graphium ulmi Schwarz.** [The Dutch Elm disease *Ceratostomella ulmi* (Schwarz) Buisman—*Graphium ulmi* Schwarz.]—*Yearbook. Univ. of Sofia, Fac. of Agric.*, Sofia, xi, pp. 71–86, 4 figs., 1932. [English summary.]

After giving, from the relevant literature, a brief but comprehensive account of the symptoms, etiology, and distribution of the Dutch elm disease and of the morphology of its causative agent (*Ceratostomella ulmi*) [*R.A.M.*, xii, p. 126], the authors state that the disease reached Bulgaria a few years ago. At present it is of common occurrence in the public parks of Sofia, and has also been recorded throughout south-western and central Bulgaria. It is presumed that the disease spread from Jugo-Slavia, where the senior author saw it generally distributed along the railway from Tzaribrod to Belgrade.

Local observations have confirmed the presence, noted by the Dutch investigators, of coremia and spores of *C. ulmi* in the galleries bored by *Scolytus scolytus* and *S. multistriatus* [loc. cit.], both of which species are widely distributed in Bulgaria, and also the occurrence around the young shoots of small galleries, in which the beetles deposit infective material. The paper terminates with a brief discussion of control measures.

Cambonie (L.). **Nos Châtaigniers sont malades: la jaunisse ou maladie des taches de feuilles.** [Our Chestnuts are diseased: the yellowing or leaf spot disease.]—*La Vie Agric. et Rurale*, xxi, 47, p. 336, 1932.

Chestnut trees in Aveyron, France, are stated to have suffered considerable damage during the summer of 1932 from the leaf spot caused by *Phyllosticta maculiformis*, which produces angular, yellow, later brown lesions leading to desiccation, defoliation, and almost total loss of fruit. By the beginning of August the affected trees presented a completely autumnal aspect. Epidemics of *P. maculiformis* are of rare occurrence; one was reported by Prillieux in 1888, involving the entire Massif Central and Périgord. The heavy rains of the current season are thought to have been responsible for the development of the fungus. Control may be effected in nurseries by spraying with a copper-containing preparation, but such measures are of course impracticable on a large scale. The

Rousse and Tounibo varieties are reputed to be resistant to leaf spot, but further investigations on this point are advisable.

GINET (J.). **La bactériose du Noyer.** [Walnut bacteriosis.]—*Journ. d'Agric. Prat.*, N.S., xcvi, 45, pp. 381–383, 2 figs., 1932.

The organism responsible for the walnut blight in the Isère Valley, France, has now been definitely identified as *Pseudomonas* [*Bacterium*] *juglandis* [*R.A.M.*, xi, p. 339]. Leaves, branches, and fruit are all attacked, the vascular tissues of the foliage being the preferred site of infection. The symptoms, however, may easily be overlooked, especially on large trees, since they are confined to the first flushes of leaves. The lesions on the nuts may penetrate right down to the kernel and cause premature shedding which results in a heavy loss of yield, while the quality of the remaining fruit is impaired. Infection begins with the new growth, indicating that the causal organism overwinters on the twigs. The disease is favoured by humidity and is most prevalent on non-grafted trees, the 'bijou' types, and the Mayette or Tullins variety, on which it is reported to have been introduced from France into California in 1907 [ibid., viii, p. 550]. The more vigorous Franquette and Parisienne walnuts are comparatively resistant. Probably the disease has been present for some considerable time in Dauphiné, escaping notice through its resemblance to anthracnose (*Marssonia* [*Marssonina*] *juglandis*) [*Gnomonia leptostyla*: ibid., viii, pp. 322, 614].

H. **Birkenmaser.** [Birch streaking.]—*Forstarchiv*, viii, 22, p. 392, 1 fig., 1932.

The high financial value of 'streaked' or 'grained' birch wood (nearly M. 100 per sq. m. in a lot of Swedish timber known to the writer) is stated not to be generally realized. In the Scandinavian countries this phenomenon is attributed to the so-called 'wisa' disease [*R.A.M.*, ii, p. 349], and attempts are in progress in Finland to grow 'streaked' material from the seed of affected trees. A watch should be kept for the possible occurrence of a similar form of graining in Germany.

BELIAYEFF (I. A.). Фитопатологическое и анатомическое исследование древесины Фисташки (**Pistacia vera L.**). [Phytopathological and anatomical investigation of Pistachio (*Pistacia vera* L.) wood.]—*Bull. Leningrad Inst. for Controlling Farm and Forest Pests*, 3, pp. 89–108, 6 figs., 2 graphs, 1932. [English summary.]

The author points out the considerable economic importance of the pistachio tree (*Pistacia vera*) in Russian Central Asia, where it grows naturally. Besides the valuable pistachio nuts (over 1,700 tons of which, representing a value, at local rates of sale, of some 4 million roubles [nominally £400,000] were collected in 1926 in the two main stands, covering an area of 27,000 hect.), the tree yields a gum which is highly esteemed locally for chewing purposes, as it is considered to have a beneficial effect on the teeth and gums, and which may also be exploited for the production of a substitute for turpentine; and a very much appreciated raspberry-

coloured dye is obtained from leaf galls caused on it by an insect. But the chief potential industrial value of the tree lies in its wood, as its technical qualities [a detailed description of which is given] are very high for joinery and decorative uses, and are only second to those of box-wood.

The only disease of the tree so far recorded in the region is a heart rot caused by *Fomes rimosus* [*R.A.M.*, x, p. 708], the incidence of which in the two main stands was found to be about 60 per cent. of the standing trees. Field observations indicate that infection usually occurs through the stumps of broken branches and twigs, but the possibility of its occurring also through wounds in the bark is not excluded. At first no discoloration is noticeable in the infected wood, but at a later stage whitish-yellow spots, lighter than the normal sapwood, appear. In decaying the wood loses much of its weight and becomes soft to such a degree that it is easily crumbled with the fingers. In the final stage of decay large cavities appear in the wood, lined with loose mycelial mats of a rusty-brown colour, resembling washleather. The hyphae spread chiefly in the resin ducts, from which they pass into the intercellular spaces and enter the vessels of the wood.

DARKER (G. D.). **The Hypodermataceae of conifers.**—*Contrib. Arnold Arboretum*, i, 131 pp., 27 pl., 1932.

The writer discusses the taxonomy and biology of 48 species of Hypodermataceae occurring on conifer needles, 24 species being described as new [with Latin diagnoses], viz., 10 on *Abies*, 3 on *Picea*, and 11 on *Pinus*. One form and one variety are raised to specific rank, namely, *Hypodermella montivaga* f. *concolor* Dearness as *H. concolor*, and *Hypoderma robustum* [*R.A.M.*, vi, p. 450; vii, p. 290] var. *pini* Dearness as *H. pini*. Six species, viz., *Lophodermium gilvum*, *L. australe*, *L. laricis* [ibid., vi, p. 126], *L. lineatum*, *H. namyslowski*, and *Scolecodothis pinicola* are not regarded as valid and are consequently reduced to synonyms as follows: *L. gilvum* = *Naemacyclus niveus*; *L. australe*, *L. laricis*, and *S. pinicola* = *L. pinastri* [ibid., xi, p. 486]; *L. lineatum* and *H. namyslowski* = *H. desmazierii*.

A new genus is created for *H. deformans* Weir, viz., *Elytroderma deformans* (Weir) comb. nov. This fungus attacks various species of *Pinus* in Canada and the United States. In California small trees of *P. jeffreyi* were observed by the writer to have been converted by the organism into loose, flat-topped brooms, with stunted branches and shortened and swollen internodes, while many saplings had succumbed to the attack. *E. deformans* may be distinguished from *Hypodermella medusa* (in which the hysterothecium is very similar) by its bicellular spores.

Lophodermellina pinastri, a name based by v. Höhnel on *Lophodermium pinastri*, belongs according to the description and to the specimens so named by v. Höhnel to *L. piceae*.

The imperfect stages of the Hypodermataceae, so far as they have been encountered, are described under each species, but it is pointed out that, with a few exceptions, positive proof of the genetic connexion between the pycnidial and hysterothecial stages is still lacking.

The most destructive species are those capable of completing their life-cycle in one year, e.g., *E. deformans*, *H. sulcigena* [loc. cit.], and *H. concolor*. Portions of needles, entire needles, or groups of needles may be killed and the stems invaded and stimulated to form witches' brooms. *H. limitata* n. sp. and *H. lacrimiformis* n. sp. destroy short sections of the middle portions of individual needles of *P. radiata* in California and *P. attenuata* in California and Oregon, respectively, resulting in the death of the whole tip beyond the killed portion. *H. nervata* n. sp. and *Bifusella faullii* n. sp., on the other hand, usually attack whole needles of *A. balsamea* (in Ontario), and in cases of heavy infection the entire year's growth is destroyed. *H. concolor* causes such severe blighting of *P. banksiana* and *P. contorta* in Canada and the United States that after one or two years of heavy defoliation, the tips of the twigs are killed and the whole branch may die. Defoliation, however, is rarely severe enough to kill a tree except in the case of very young seedlings, while needle casting is also chiefly of importance in the young growth.

Successful inoculation experiments were carried out with *Hypoderma desmazierii* on *P. strobus*, *P. banksiana*, and *P. resinosa*, *Hypodermella laricis* on *Larix laricina*, *H. concolor* on *P. banksiana*, and *H. nervata* on *A. balsamea*. Experiments with *B. faullii* on *A. balsamea* yielded a few doubtfully successful infections.

LIESE (J.). **Zur Biologie der Douglasiennadelschütte.** [On the biology of the leaf fall of Douglas Fir.]—*Zeitschr. für Forst- u. Jagdwesen*, lxiv, 11, pp. 680–693, 1 fig., 2 graphs, 1 map, 1932.

In connexion with a recapitulation of the chief points in the life-history of *Rhabdocline pseudotsugae*, the causal organism of leaf fall of Douglas firs [*Pseudotsuga taxifolia*: *R.A.M.*, xii, pp. 65–67], the writer points out that the fungus cannot develop further on diseased branches cut off before April, so that it is unnecessary to burn the brushwood removed prior to this date. In many cases the infected needles are spontaneously thrown off during the autumn and winter before the fructifications can develop, while even those remaining on the trees do not necessarily produce the perfect stage of the fungus in May.

Observations in the silvicultural area of Chorin [Mark Brandenburg], where Douglas firs from 19 localities in the United States were planted 22 years ago, showed that most of the blue (*glauca*) mountain and grey (*caesia*) intermediate varieties are highly susceptible to leaf fall, whereas the valuable, rapidly growing green [*viridis*] coastal forms have hitherto remained almost or quite immune. Very heavy infection (60·4 per cent.) was recorded on a group of 192 trees that came from the mountains of central Colorado, while the disease occurred also in a more or less severe form on some of those originating in New Mexico, Idaho, and Washington. However, the presence of immune or highly resistant individuals among these groups encourages the hope of successful selection in nurseries and horticultural establishments. No infection occurred on the coastal forms originating from a locality in

Washington 170 to 200 ft. above sea-level, or from two places in California at altitudes of 1,400 and 1,530 ft., respectively.

The immunity of the coastal varieties may be attributed in part to their late development, the buds being still unopened at the period of spore dissemination. The mountain varieties, on the other hand, mature early and their buds open at the time of maximum virulence of the fungus.

The writer has recently succeeded in the artificial inoculation of young (three- to five-year-old) blue and grey Douglas firs, while the occurrence of spontaneous infection on similar trees in a Pomeranian forest has also been observed. Emphasis is laid on the necessity for the exclusive cultivation in Germany of the late maturing green varieties of Douglas fir.

Legislative and administrative measures. France.—*Internat. Bull. of Plant Protect.*, vi, 11, pp. 184–185, 1932.

A Decree of 12th October 1932 (cited in the *Journal Officiel de la République Française*, lxiv, 242, pp. 11075–11077, 1932) provides for the reorganization of the French Plant Protection Service [*R.A.M.*, vii, p. 415], the functions of which are defined as comprising: (1) the scientific study of plant diseases and pests, research and experiments with control methods (in co-operation with the Institute of Agronomic Research); (2) the sanitary supervision of plant production, the distribution of knowledge of the treatments to be used, and the practical organization (with the assistance of the State and municipal bodies) of permanent and voluntary defence against diseases and organisms injurious to plants and plant products; (3) the control of the legalized measures for combating plant diseases and pests, the phytosanitary supervision of imports and exports, and the phytosanitary control of the markets, of marks of origin, and of the standardization of products and their packings; and (4) the issue of phytopathological certificates and supervision of the nurseries and the like supplying the products.

A Consultative Committee for Plant Protection is established under the 'Direction de l'Agriculture', its functions to be defined by an Order of the Minister of Agriculture. An Inspector-General of Agriculture appointed by the Minister of Agriculture is responsible for the co-ordination of the different branches of the Service and for their satisfactory working.

Legislative and administrative measures. Italy.—*Internat. Bull. of Plant. Protect.*, vi, 11, p. 185, 1932.

A Decree of 5th August, 1932, issued by the Prefect of the province of Catania, Sicily, enforces the excision and burning of any branches of lemon trees affected by the 'mal secco' (*Deuterophoma tracheiphila*) [see above, p. 214] in the communes of Belpasso, Castiglione di Sicilia, Gravina, Misterbianco, Paternò, and Tremestieri Etneo. Holders of land bearing diseased trees will be made responsible for the execution of these orders.